Technical Specifications

Final Design (100% Design)

Remedial Design

Area 9/10

Southeast Rockford Groundwater Contamination Superfund Site

Rockford, Illinois

CERCLIS ID No. ILD981000417

March 31, 2007

Prepared for:

Hamilton Sundstrand Corporation
4747 Harrison Avenue
Rockford, Illinois 61125

Submitted by:

SECOR International Incorporated
446 Eisenhower Lane North
Lombard, Illinois 60148

Technical Specifications

Final Design (100% Design)

Remedial Design

Area 9/10

Southeast Rockford Groundwater Contamination Superfund Site

Rockford, Illinois

CERCLIS ID No. ILD981000417

March 31, 2007

Prepared for:

Hamilton Sundstrand Corporation
4747 Harrison Avenue
Rockford, Illinois 61125

Submitted by:

SECOR

SECOR International Incorporated
446 Eisenhower Lane North
Lombard, Illinois 60148

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Purpose Of Technical Specifications 1
1.2 Technical Specification Implementation 3
1.3 Site Background 4
1.3.1 Site Description 4
1.3.2 HS Plant #1 Facility Constituents of Concern 5
1.3.3 Hydrogeological Setting 5
1.3.4 Extent of Soil Impacts 6
1.4 Document Overview 8

SPECIFICATIONS GROUP:

A. GENERAL REQUIREMENTS SUBGROUP

Division 01 General Requirements

Section 01 11 00 Summary of Work
Section 01 14 00 Work Restrictions
Section 01 22 00 Unit Prices
Section 01 23 00 Alternates
Section 01 25 00 Substitution Procedures
Section 01 26 00 Contract Modification Procedures
Section 01 26 39 Field Orders
Section 01 26 63 Change Order
Section 01 31 00 Project Management and Coordination
Section 01 32 00 Construction Progress Documentation
Section 01 33 00 Submittal Procedures
Section 01 35 29 Health, Safety, and Emergency Response Procedures
Section 01 35 43 Environmental Procedures
Section 01 43 00 Quality Assurance
Section 01 45 00 Quality Control
Section 01 56 00 Temporary Barriers and Enclosures
Section 01 60 00 Product Requirements
Section 01 74 00 Cleaning and Waste Management
Section 01 77 00 Closeout Procedures

B. FACILITY CONSTRUCTION SUBGROUP

Division 02 Existing Conditions

Section 02 51 00 Physical Decontamination

Section 02 81 00 Transportation and Disposal of Contaminated Soils

Division 03 Concrete

Section 03 11 00 Concrete Forming

Section 03 20 00 Concrete Reinforcing

Section 03 30 00 Cast-In-Place Concrete

Division 11 Equipment

Section 11 90 01 Air Compressor

Section 11 90 02 Vacuum Blower

Section 11 90 03 Air/Water Separator

Section 11 90 04 Granular Activated Carbon Units

C. FACILITY SERVICES SUBGROUP

Division 26 Electrical

Section 26 05 00 Common Work Results for Electrical

Section 26 51 00 Interior Lighting

Division 27 Communications

Section 27 20 00 Data Communications

D. SITE AND INFRASTRUCTURE SUBGROUP

Division 31 Earthwork

Section 31 23 00 Excavation and Fill

Section 31 80 00 Well Abandonment

Section 31 81 00 Well Installation

Division 32 Exterior Improvements

Section 32 11 00 Base Courses

Section 32 12 00 Flexible Paving

Section 32 90 00 Planting

E. PROCESS EQUIPMENT SUBGROUP

Division 40 Process Integration

Section 40 05 00 Common Work Results for Process Piping

Section 40 91 00 Primary Process Measurement Devices

Section 40 92 00 Primary Control Devices

Section 40 95 00 Process Control Hardware

Division 44 Pollution Control Equipment

Section 44 11 00 Air Pollution Control Equipment

1.0 INTRODUCTION

This document provides the Technical Specifications for the Remedial Design for Source Control for the Area 9/10 portion of the Southeast Rockford Groundwater Contamination Superfund Site (CERCLIS ID No. ILD981000417) located in the City of Rockford, Winnebago County, Illinois.

Hamilton Sundstrand Corporation (HS) entered into an Administrative Order on Consent (AOC) with the United States Environmental Protection Agency (USEPA) on January 13, 2003 for the completion of a Remedial Design (RD) for source control for Area 9/10. Preparation of the Technical Specifications was specified as part of the February 27, 2003 Statement of Work (SOW) associated with the RD.

The selected remedy for Area 9/10 Remedial Design consists of air sparging and soil vapor extraction to address impacted groundwater (leachate) at the Hamilton Sundstrand Plant # 1 facility within Area 9/10. The remedy is described in the June 11, 2002 Record of Decision (ROD) for Operable Unit Three (OU-3) Source Control. In addition, soil identified as source material at the Outside Container Storage Area (OSA) will be excavated and disposed offsite along with limited groundwater biological enhancement in this location.

1.1 PURPOSE OF TECHNICAL SPECIFICATIONS

The purpose of this document is to provide the framework and details to complete the RA. These Technical Specifications have been developed for the selected remedy at Area 9/10 of the Southeast Rockford Groundwater Contamination Site (SER). The selected remedy consists of air sparging and soil vapor extraction to address impacted groundwater (leachate) at the Hamilton Sundstrand Plant # 1 facility within Area 9/10. In addition, soil identified as source material at the Outside Container Storage Area (OSA) will be excavated and disposed offsite along with limited groundwater biological enhancement in this location. An engineered barrier will be placed over the OSA upon completion of the excavation activities to the target depth.

A summary of the selected remediation alternatives, air sparging (AS) and soil vapor extraction (SVE), from the ROD is as follows:

Groundwater (leachate) Remedy:

- *Alternative SCL-9/10E: Enhanced Air Sparging, which consisted of installing injection wells along the boundary of the Groundwater Management Zone (GMZ) and source area, was the selected remedy. Enhanced Air Sparging will involve the placement of air injection wells down gradient and in the more highly-contaminated areas. Air will be injected into the contaminated groundwater, causing the contaminants to volatilize into air pockets in the soil above the water table. The air sparging will have to be operated in conjunction with the Soil Vapor Extraction System SCS-9/10C. Vapors will be collected underground prior to their treatment with activated carbon.*

- *The leachate remedy also includes institutional controls on groundwater usage within the GMZ, installation of monitoring wells, and implementation of a groundwater (leachate) monitoring program. Groundwater (leachate) will be monitored at predetermined intervals for 30 years, per Resource Conservation and Recovery Act (RCRA) post-closure groundwater monitoring requirements. Monitoring will typically consist of collecting groundwater and analyzing for volatile organic compounds (VOCs) and, where appropriate, parameters that measure biological activity.*

Soil Remedy:

- *Alternative SCS-9/10C: Soil Vapor Extraction with vapor treatment using activated carbon was the selected remedy for soils at Area 9/10. Under this alternative, contaminated soils will be remediated in situ via a SVE system. The system will consist of installing a series of wells connected by an underground piping system. A blower will provide a source of negative pressure to extract vapors from the subsurface. Extraction wells will be screened in the vadose zone, where they will remove the contaminants from the unsaturated zone, as well as groundwater (leachate) contaminants that might diffuse from the surface of the water table. A pilot program will be conducted prior to the design of the*

SVE system to determine well spacing and in situ air permeability. Vapors collected from the SVE unit will be treated through the use of granular activated carbon. Granular activated carbon can be used to treat vapors at this area because of the lower expected concentrations of contaminants from soils.

1.2 TECHNICAL SPECIFICATION IMPLEMENTATION

The function of the technical specifications is to provide specific details to contractors of 1) what is required to implement the remedial design and 2) how the work is to be performed. This is done to protect the USEPA from additional cost burdens if the work is not completed in a satisfactory manner, as they are typically responsible for the site costs. Typically under CERCLA the Remedial Action (RA) construction is performed by third party contractors with no direct connection to the facility. This will likely not be the case at Area 9/10. The technical specifications provided are in part to provide the necessary framework and detail for the execution of the RA if the USEPA should need to contract this work directly.

It is anticipated that HS will enter into an agreement vehicle (agreement) with USEPA for the implementation of the RA. Assuming that an agreement for the RA is negotiated, HS will assume the responsibility for the costs associated with the installation of the RA and subsequent operation, maintenance, and monitoring. For the RA construction, HS will likely use local contractors that have been, currently are, and plan to be working for HS in the future and, therefore, have a vested interest in performing the work in a satisfactory manner. Also HS owns the Plant #1 property which is an active manufacturing facility and is responsible for facility maintenance. Therefore, if HS enters into an agreement for the RA and assumes the costs for the implementation of the RA, it is anticipated that the technical specifications will be used predominantly as guidance for the installation. As such there will be flexibility available to HS, its consultants, and contractors to use good field judgment and prudent cost benefit evaluation to determine if strict adherence to every technical specification item is necessary and required. USEPA will be kept informed of changes made from the specifications and involved with substantial implementation decisions.

1.3 SITE BACKGROUND

1.3.1 Site Description

Area 9/10 (Area) is an industrial area located within the City of Rockford, Winnebago County, Illinois. The Area is bound by Eleventh Street on the east, Twenty-Third Avenue on the north, Harrison Avenue on the south, and Sixth Street on the west. Hamilton Sundstrand Corporation was the only potentially responsible party identified by the Illinois Environmental Protection Agency (IEPA) for Area 9/10. The Hamilton Sundstrand (HS) Plant #1 facility (the Site) is located within Area 9/10. The Area 9/10 and HS Site locations are shown on Drawing Y1. The address of the facility is 2421 Eleventh Street. The Site is located in the southeast portion of the City of Rockford, Illinois, in Section 36 of Township 44 north, Range 1 east, of Rockford Township in Winnebago County. The HS Plant # 1 facility within Area 9/10 is a generally rectangular area of approximately 13 acres. The Site is bound on the north by 23rd Avenue and former Mid-States Industrial (2401 Eleventh Street), on the south by the former Nylint/DRB property (2525 Eleventh Street) and the Rockford Products Parking lot, to the west by 9th Street, and on the east by 11th Street.

The SER site consists of three Operable Units, each with a corresponding ROD. Operable Unit One (Drinking Water Operable Unit) provided some area residents with a safe drinking water supply by connecting 283 homes to the city water supply. Operable Unit Two (Groundwater Operable Unit) addressed the area-wide groundwater contamination. An additional 264 homes were connected to the city water supply and a remedial investigation (RI) was conducted to characterize the nature and extent of the groundwater contamination and to provide information on source areas responsible for contamination. This operable unit identified four source areas (Areas 4, 7, 9/10, and 11). Operable Unit Three (Source Control Operable Unit) began as a State lead action to select remedies for each of the source areas. Based on the field investigation activities conducted by the IEPA at each of the areas, cleanup alternatives and selected remedies were presented in the May 2002 Source Control Remedies ROD issued by the USEPA and the IEPA.

The selected source control remedies for Area 9/10 are enhanced air sparging for leachate, soil vapor extraction with treatment of vapors by granular activated carbon for soil, and institutional controls. The term leachate is defined as water that passed through waste and picked up contaminants present in the waste.

1.3.2 HS Plant #1 Facility Constituents of Concern

The HS Plant #1 facility was identified during the RI, performed by CDM for IEPA, and the Pre-Design Investigation (PDI), undertaken by HS, as containing groundwater impacted with VOCs above the Preliminary Remediation Goals (PRGs) identified in the ROD. The compounds detected at concentrations above the PRGs are referred to as constituents of concern (COCs). A network of 28 monitoring wells was established at the facility during the PDI. The monitoring well locations and topography (monitoring well ground surface elevations) are shown on Drawing Y3.

The RI also identified COCs in groundwater with concentrations above PRGs. The PRGs were based on 35 IAC Part 620 Groundwater Quality Class I groundwater, 35 IAC Part 742 Tiered Approach to Corrective Action Objectives (TACO), and USEPA maximum contaminant level (MCL) regulations. The groundwater COCs were identified as 1,1-dichloroethene (1,1-DCE); 1,2-dichloroethane (1,2-DCA); 1,2-dichloroethene (1,2-DCE); ethylbenzene; tetrachloroethene (PCE); 1,1,1-trichloroethane (1,1,1 TCA), 1,1,2-trichloroethane (1,1,2 TCA); trichloroethene (TCE); and vinyl chloride (VC), as agreed upon with USEPA and IEPA. The historical groundwater analytical results from the western portion of the building are shown on Drawing Y4.

The soil COCs for Area 9/10 were identified as: 1,1-DCE; methylene chloride (MC) (possible laboratory artifact); PCE; 1,1,1 TCA; 1,1,2 TCA; and TCE as agreed upon with USEPA and IEPA.

1.3.3 Hydrogeological Setting

The geological profile encountered at the HS Plant #1 Facility generally consists of surface pavement (asphalt, concrete pad, or floor slab) with a gravel fill subbase

from ground surface to one to two feet below ground surface (bgs), underlain by silty clay to a depth of four to eight feet bgs, which is underlain by poorly to well graded sand (predominantly fine to medium sand) with some gravelly units to below the maximum depth of the borings at the site (140 feet). The sand and gravel has been reported to extend to a depth of 230 to 250 feet bgs in the vicinity of Area 9/10. This glacial outwash is identified as the Mackinaw Member of the Henry Formation. Bedrock encountered in borings/wells in the area is part of the Ordovician period Ancell Group (sandstone) of the Paleozoic era.

The vadose zone extends within the sand to a depth of approximately 30 feet bgs. Within the vadose zone sand there is a discontinuous one to four feet thick silt layer at approximately 18 to 23 feet bgs which was identified in the OSA. This layer was observed only in a limited area in the northwest portion of the Site. No other substantive or continuous fine grained layers or lenses were documented during the PDI activities. At depth within the aquifer some coarser grained gravelly sand and sandy gravel units were observed.

The uppermost aquifer at the Site is the sand and gravel aquifer. The potentiometric surface level ranges between 30 to 35 feet bgs. This level varies somewhat seasonally and appears to mirror the general rainfall pattern of the area. Over the past several years the water level has typically been approximately 33 feet bgs. The aquifer is greater than 100 feet in thickness at the Site. The groundwater flow is to the west-southwest at a gradient of approximately 0.0008 ft/ft (0.6 ft / 715 ft in March 2006) toward the Rock River. The hydraulic conductivity of the sand aquifer is 1.22×10^{-3} cm/sec and the aquifer porosity is assumed to be 0.25 (both from the CDM FFS 2000). Using this data, it is estimated that the average linear velocity (also referred to as groundwater seepage velocity) is likely between 4 and 10 feet per year.

1.3.4 Extent of Soil Impacts

The initial RI activities completed by CDM in Area 9/10 consisted of soil gas samples and limited soil sampling. A more comprehensive Pre-Design Investigation consisting of 38 soil borings across the Site, including adjacent properties and public right of ways, was completed by HS in 2003 and 2004. This

effort identified three areas of soils which exceed the PRG (and TACO) remediation objectives (ROs). These areas were the OSA, the loading dock and former container storage area, and the western part of the South Alley. The ROD requires that source material be addressed in the remedial design.

Soil in the OSA may be considered source material. Concentrations of 1,1,1-TCA, 1,1-DCE, PCE, TCE, mercury, cadmium, and lead were detected in samples S1 through S8 above ROs. A number of the constituents were found in only relatively shallow soil (less than 8 feet bgs). PCE and cadmium were the only constituents detected above ROs in deeper soils. These metals are not COCs as defined in the ROD. However, the OSA is also subject to RCRA regulations, and these metals are of concern from this perspective.

In the loading dock and former container storage areas, soil concentrations at four boring locations (S12, S13, S14, and SMW-15) exceeded ROs. The elevated concentrations were all in the shallow soil sample intervals at these locations. There were no RO exceedances in the deeper soil samples analyzed at these locations and the impact is believed to be limited vertically. Impacted soil in the loading dock area will be addressed. The remedial activities will likely consist of limited excavation, pending final delineation. This area is presently covered with asphalt.

There was a soil PCE RO exceedance at the SMW-5 location (5 to 7 feet) southwest of the HS Plant # 1 building. There was, however, no PCE detected in the deep soil sample at this location. This area is not considered source material. This location is, however, adjacent to the treatment zone of the air sparge and soil vapor extraction system in the South Alley.

The VOC impacted soil at the OSA is a 65 foot by 50 foot area of approximately 3,300 square feet. HS plans to address these soils by excavation with offsite soil disposal. The impacted soil is primarily in the soil column from ground surface to six feet in depth. The total estimated in place quantity of impacted soil at the OSA is 550 cubic yards (850 tons). Drawing Y4 illustrates the lateral extent of soil impact above ROs at the OSA. A work plan for the excavation of the source

material at the OSA was submitted to USEPA dated April 27, 2005 and was approved with modification on August 15, 2005.

1.4 DOCUMENT OVERVIEW

This document provides the details of the framework and details for the implementation of the RA activities. The Technical Specifications are provided in accordance with the Construction Specifications Institute (CSI) requirements in Masterformat™ 2004. The RA activities are presented in five specification subgroups which encompass nine specification divisions. The document sections correspond to the specification subgroups as follows:

- General Requirements includes the administrative aspects of the work such as contracting, pricing, changes or substitution, project management, coordination, documentation, quality assurance, quality control, and general site expectations. Individual specifications contained in Division 01 are provided in Section A of this document;

- Facility Construction includes identification of existing conditions, transportation of contaminated soils, and completion of concrete work. Individual specifications contained in Divisions 01 and 02 are provided in Section B of this document;

- Facility Services includes electrical work and communications. Individual specifications contained in Divisions 26 and 27 are provided in Section C of this document;

- Site and Infrastructure includes earthwork and exterior improvements such as asphalt paving and planting. Individual specifications contained in Divisions 31 and 32 are provided in Section D of this document; and

- Process Equipment includes process integration and pollution control equipment. Individual specifications contained in Divisions 40 and 44 are provided in Section E of this document.

SECTION 01 11 00

SUMMARY OF WORK

PART 1 - GENERAL

1.1 SCOPE

This section presents a general summary of the scope of work, reasons for the work, project schedule and work sequence for the groundwater and soil remediation project at the Area 9/10 portion of the Southeast Rockford Groundwater Contamination Superfund Site (SER site, CERCLIS ID No. ILD981000417) located in the City of Rockford, Illinois

1.2 DESCRIPTION

A. History and Background

Area 9/10 "Area" is an industrial area located within the City of Rockford, Winnebago County, Illinois. The Area is bound by Eleventh Street on the east, Twenty-third Avenue on the north, Harrison Avenue on the south, and Sixth Street on the west. Hamilton Sundstrand Corporation was the only potentially responsible party identified by the Illinois Environmental Protection Agency (IEPA) for Area 9/10. The Hamilton Sundstrand (HS) Plant #1 facility "the Site" is located within Area 9/10. The Area 9/10 and HS Site location are shown on Drawing Y-1. The address of the facility is 2421 Eleventh Street. The Site is located in the southeast portion of the City of Rockford, Illinois, in Section 36 of Township 44 north, Range 1 east, of Rockford Township in Winnebago County. The HS Plant # 1 facility within Area 9/10 is generally rectangular area of approximately 13 acres. The Site is bound on the north by 23rd Avenue, on the south by the former DRB Property and Rockford Products Parking lot, to the west by 9th Street, and on the east by 11th Street. The site utilities and property boundary for the HS Plant #1 facility are shown on Drawing Y2.

The SER site consists of three Operable Units each with a corresponding Records of Decision (ROD). Operable Unit One (Drinking Water Operable Unit) provided some area residents with a safe drinking water supply by connecting 283 homes to the city water supply. Operable Unit Two (Groundwater Operable Unit) addressed the area-wide groundwater contamination. An additional 264 homes were connected to the city water supply and a remedial investigation (RI) was conducted to characterize the nature and extent of the groundwater contamination and to provide information on source areas responsible for contamination. This operable unit identified four source areas (Areas 4, 7, 9/10, and 11). Operable Unit Three (Source Control Operable Unit) began as a State lead action to select remedies for each of the source areas. Based on the field investigation activities conducted by the IEPA at each of the areas, cleanup alternatives and selected remedies were presented in the May 2002 Source Control Remedies ROD issued by the Untited States Environmental Protection Agency (USEPA) and the IEPA.

The selected source control remedies for Area 9/10 consists of air sparging with soil vapor extraction (SVE). Air sparging technology will be used to treat impacted groundwater and act as treatment barrier, preventing off site migration. SVE will be used to capture vapors produced by air sparging and volitalize contaminats entrapped in the soil.

The HS Plant #1 facility was identified during the RI and Pre-Design Investigation (PDI) activities as containing groundwater impacted with volatile organic compounds (VOCs) above the Preliminary Remediation Goals (PRGs) identified in the ROD. A network of 28 monitoring wells has been established at the facility to determine the extent of the VOC

contamination. The monitoring well locations and topography (monitoring well ground surface elevations) are shown on Drawing Y3.

The RI also identified Contaminants of Concern (COCs) in groundwater above PRGs. The PRGs were based on 35 IAC Part 620 Groundwater Quality, 35 IAC Part 742 TACO Class I groundwater, and USEPA maximum contaminant level (MCL) regulations. The groundwater COCs were identified as 1,1-dichloroethene (1,1-DCE); 1,2-dichloroethane (1,2-DCA); 1,2-dichloroethene (1,2-DCE); ethylbenzene; tetrachloroethene (PCE); 1,1,1-trichloroethane (1,1,1 TCA), 1,1,2-trichloroethane (1,1,2 TCA); trichloroethene (TCE); and vinyl chloride (VC) as agreed upon with USEPA and IEPA. The historical groundwater analytical results are shown on Drawing Y4.

The soil COCs for Area 9/10 were identified as: 1,1-DCE; methylene chloride (MC) (possible laboratory artifact); PCE; 1,1,1 TCA; 1,1,2 TCA; and TCE as agreed upon with USEPA and IEPA.

The geological profile encountered at the HS Plant #1 Facility generally consists of surface pavement (asphalt, concrete pad, or floor slab) with a gravel fill subbase from ground surface to one to two feet below grade surface (bgs), underlain by silty clay to a depth of four to eight feet bgs, which is underlain by predominantly fine to medium sand to below the maximum depth of the borings at the site (140 feet). The sand and gravel has been reported to extend to a depth of 230 to 250 feet bgs in the vicinity of Area 9/10. This glacial outwash is identified as the Mackinaw Member of the Henry Formation. Bedrock encountered in borings/wells in the area is part of the Ancell Group (sandstone) of Paleozoic age.

The vadose zone extends within the sand to a depth of approximately 30 bgs. Within the vadose zone exists a one to four feet thick silt layer at approximately 18 to 23 feet bgs. The intermittent silt layer was identified by borings advanced in the Outside Storage Container Area (OSA). This layer was observed only in limited areas at the northwest portion of the Site. No other substantive fine grained layers or lenses were documented during the PDI investigation activities. At depth within the aquifer there are coarser grained gravelly sand and sand gravel units.

The uppermost aquifer at the site is the sand and gravel aquifer. The potentiometric surface level is approximately 30 feet bgs. This level varies somewhat seasonally and appears to mirror the general rainfall pattern of the area. The aquifer is greater than 100 feet in thickness at the Site. The groundwater flow is to the west-southwest at a gradient of approximately 0.0008 ft/ft (0.6 ft / 715 ft in March 2006) toward the Rock River. The hydraulic conductivity of the sand aquifer is 1.22×10^{-3} cm/sec and the aquifer porosity is 0.25 (both from the CDM Focus Feasibility Study [FFS] 2000). Due to the relatively flat gradient, the average linear velocity (also referred to as groundwater seepage velocity) is approximately 4.04 feet per year.

The initial RI activities completed by CDM in Area 9/10 consisted of soil gas samples and limited soil sampling. A more comprehensive PDI consisting of 38 soil borings advanced across the Site, and at adjacent properties and public right of ways, was completed by HS in 2003 and 2004. This effort identified three areas of concern where soil impact exceeded the PRG (and TACO) remediation objectives (ROs). These areas were the OSA, the loading dock and former container storage area, and the western part of the South Alley. The ROD requires that source material be addressed in the remedial design.

Soil in the OSA may be considered source material. Concentrations of 1,1,1-TCA, 1,1-DCE, PCE, TCE, mercury, cadmium, and lead were detected in samples S1 through S8 above ROs. A number of the constituents were found in only relatively shallow soil (less than 8 feet

bgs). PCE and cadmium were the only constituents detected above ROs in deeper soils. These metals are not contaminants of concern (COCs) as defined in the ROD. However, the OSA is also subject to RCRA regulations and these metals are of concern from this perspective.

In the loading dock and former container storage areas, soil concentrations at four boring locations (S12, S13, S14, and SMW-15) exceeded ROs. The elevated VOC concentrations were all in the shallow soil sample intervals at these locations. There were no RO exceedances in the deeper soil samples analyzed at these locations and the impact is believed to be limited vertically. Therefore these impacts are not considered source material in the context of the ROD. This area is presently covered with asphalt.

There was a soil PCE RO exceedance at the SMW-5 location (5 to 7 feet) southwest of the HS Plant # 1 building. There was, however, no PCE detected in the deep soil sample at this location. This area is not considered source material. The sample location iswithin the planned treatment zone of the soil vapor extraction system in the South Alley.

The VOC impacted soil at the OSA is a 65 feet by 50 feet area of approximately 3,300 square feet. HS plans to address these soils by excavation with offsite soil disposal. The impacted soil is primarily in the soil column from ground surface to six feet in depth. The total estimated in place quantity of impacted soil at the OSA is 550 cubic yards (850 tons). Drawing Y4 illustrates the lateral extent of soil impact above the PRGs (and TACO) at the OSA. A revised work plan for the excavation of the source material at the OSA was submitted to USEPA on June 28, 2005 and was approved with modification on August 15, 2005.

B. Work Description

The Scope of Work (Work) for the SER site includes the following:

- Installation of an air sparge treatment system in the western portion of the South Alley.
- Installation of a soil vapor extraction system to capture the air sparge injected air in the western portion of the South Alley.
- Outside container storage area (OSA) groundwater attenuation enhancement material placement.
- OSA soil excavation including well abandonment, waste characterization, excavation, loading, transport, offsite disposal of source materials, backfill, and cap placement.
- Loading Dock area demolition and limited excavation (pending results).

The above description of the Work is for general information only, and in no way limits the responsibility of the Contractor for constructing the Work in strict accordance with the Contract Documents.

1.3 SUBMITTALS

(Not Used)

1.4 APPLICABLE STANDARDS

(Not Used)

1.5 CONTRACT DOCUMENTS

A. The Contract Documents are composed of three volumes:

1. Contract

2. Project Manual

3. Contract Drawings

1.6 SCHEDULE AND SEQUENCE OF WORK

A. Arrange the work tasks to meet the requirements established within the Contract Documents.

B. Coordinate all work with the Engineer in a timely manner.

C. The Contractor shall submit a construction schedule and plans in accordance with Section 01 32 00 to the Engineer for review. The Contractor shall keep the Engineer informed of progress of the Work, the construction schedule, and any changes thereto in a timely manner. Contractor shall not receive additional compensation for work performed outside normal work hours if such work is for Contractors convenience or if such work is necessary to maintain Project schedule or to meet Project deadlines.

D. In general, the Work shall proceed in a systematic manner to minimize inconvenience or disturbance on facility operations and the public during the course of construction.

1.7 PERMITS

Permits: The Contractor is responsible for obtaining all permits necessary for completion of the project.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION 01 11 00

SECTION 01 14 00

WORK RESTRICTIONS

PART 1 - GENERAL

1.1 SCOPE

A. Contractor shall secure work areas from trespass, vandalism, public access, and public contact with potentially harmful materials. Protection of the work areas shall be the responsibility of the Contractor. The Contractor shall coordinate site security with the Engineer. The Contractor is also responsible for the security of the Contractor's materials, supplies and equipment.

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTALS

A. No later than fifteen (15) calendar days after receipt of Notice of Award, but before beginning work, Contractor shall submit to the Engineer for approval a plan outlining Contractor's site security program. The plan shall be prepared and executed in accordance with the requirements in this section, and other relevant sections of this Specification. Contractor's Site Security Plan may be incorporated into Contractor's Health and Safety Plan.

B. Contractor's Site security plan shall be in compliance with all applicable OSHA, EPA, Section 01 35 29 of these Specifications, and Contractor's Health and Safety Plan.

C. Contractor shall designate in the Plan a site security officer. This may also be the Site Health and Safety Officer, as required per Section 01 35 29 of the Specifications.

1.4 APPLICABLE STANDARDS

A. Occupational Safety and Health Administration (OSHA) Standards and Regulations.

B. Standards outlined in the NIOSH/OSHA/USCG/EPA Occupational Safety and Health Guidance Manual for Hazardous Site Activities, October, 1985, DHHS (NIOSH) Publ. No. 85-115.

1.5 ENTRY CONTROL

A. Contractor shall maintain control of Site entry and material flow across the Site boundary.

B. Entrance to the Site shall be restricted. Only authorized personnel employed by the Owner, Engineer, Contractor, subcontractors, vendors and suppliers, or emergency vehicles, shall be granted access to the Site.

C. Sign in or log-in procedures shall conform to all applicable health and safety regulations and requirements outlined in Section 01 35 29.

D. Access by authorized representatives of federal, state and local government shall be granted at any time, subject to the conditions of Section 01 35 29 and the Contractor's Health and Safety Plan.

E. Open fire lanes are to be maintained at all times in accordance with local and state codes.

1.6 SECURITY BARRIERS

During execution of the Work, the Contractor shall construct and, at all times, maintain satisfactory and substantial temporary chain link fencing, solid fencing, railing, barricades, steel plates, or other barriers, as necessary, to limit unauthorized access to all openings, trenches, obstructions, or other areas of the Site where construction is in progress.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION 01 14 00

SECTION 01 22 00

UNIT PRICES

PART 1 - GENERAL

1.1 SCOPE

This section describes the methods and standards for measurement used in determining payment for Work required under the Contract. This section includes measurement and payment criteria applicable to the Work performed under a unit price and lump-sum payment method including defect assessment and non-payment for rejected work.

1.2 DESCRIPTION

Contractor shall take all measurements and compute quantities. The Engineer will verify measurements and quantities.

1.3 SUBMITTALS

A. All documentation submitted in regards to progress and final payments shall be in accordance with Contract Documents and Section 01 33 00.

B. Requests for progress and final payments shall be submitted in accordance with requirements set forth in Contract Documents.

C. Contractor shall submit requests for payment in a format that clearly indicates the request and is based on verifiable units and work completed, and which is consistent with the Schedule of Unit Prices and Contract Bid Form.

D. The Contractor's invoice shall clearly indicate the same information as required for subcontractor, for those persons employed by the Contractor.

E. The Contractor's request for payment shall clearly indicate by major tasks, as shown on the Contract Bid Form, the total dollars requested, total dollars to-date received, total dollars retained until project completion, percent dollars spent of total budget, percent dollars remaining, number of units completed for each task in the request, total number of units completed to date, and total number of units in the Contract.

1.4 APPLICABLE STANDARDS

(Not Used)

1.5 UNIT QUANTITIES SPECIFIED

A. Estimated quantities indicated in the Contract Bid Form are for bidding and contract purposes only. Quantities and measurements supplied or placed for the Work and verified by the Engineer determine payment.

B. If the actual Work requires more or fewer quantities than those quantities indicated in

the Contract Bid Form, Contractor shall provide and complete those quantities necessary to complete the Work. Contractor shall be compensated for such work in accordance with the procedures set forth in the Contract Documents.

1.6 MEASUREMENT OF QUANTITIES

A. Measurement Standards: All work to be paid for at a contract price per unit of measurement will be measured in accordance with United States Standard Measures. A ton shall consist of 2,000 pounds.

B. Measurement Devices:

1. Weigh Scales: Inspected, tested and certified by theState of Illinois Weights and Measures Department within the past year.

2. Platform Scales: Of sufficient size and capacity to accommodate the conveying vehicle.

3. Metering Devices: Inspected, tested and certified by the State of Illinois Weights and Measures Department within the past year.

C. Measurement by Volume: Measured by cubic dimension using mean length, mean width and mean height or mean thickness in the units shown on the Schedule of Unit Prices.

D. Measurement by Area: Measured by square dimension using mean length and mean width or radius in the units shown on the Schedule of Unit Prices.

E. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord in the units shown on the Schedule of Unit Prices.

F. Lump-Sum Measurement:

1. Lump-sum measurement will be for the entire item, unit of work, structure, or combination thereof, as listed or indicated in the Schedule of Unit Prices and Contract Bid Form.

2. If the Contractor requests progress payments for lump-sum items or amounts in the Schedule of Unit Prices, such progress payments will be made in accordance with a well-balanced, detailed program of payment-apportioning, prepared by the Contractor and submitted to the Engineer for approval.

3. Such program for each applicable lump-sum item shall show estimated quantities and unit prices therefore as allocated by the Contractor to the different features of the work and major subdivisions thereof. The summation of extensions of quantities and unit prices and related costs shall total, in each case, the exact amount to be paid under the Schedule of Unit Prices for Lump-Sum Work.

4. Such programs will be the basis for computing progress payments as provided herein, consistent with the requirements of the Contract Documents and the amount of final payment for the Work shall be subject to the restrictions, limitations and conditions set forth in the Contract Documents,

including, but not limited to, Contractor's compliance with the notice requirements thereof relating to quantities for Unit Price Work.

H. Measurement by Time: For time spent performing out of scope work, compensation will be made by time actually spent working under the specified conditions. Measurement will be to the nearest one-half (1/2) hour.

1.7 PAYMENT

A. Payment Includes: Full compensation for all required labor, products, tools, equipment, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit, applicable taxes and incidental costs.

B. Final payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities accepted by the Engineer and in accordance with conditions set forth in the contract documents multiplied by the unit sum/price for Work which is incorporated in or made necessary by the Work.

1.8 DEFECT ASSESSMENT

Defect assessment shall be in accordance with requirements set forth in the Contract Documents.

1.9 NON-PAYMENT FOR REJECTED PRODUCTS

In accordance with Contract Documents, payment will not be made for any of the following:

1. Products wasted or disposed of in a manner that is not acceptable to the Engineer.

2. Products determined as unacceptable before or after placement.

3. Products not completely unloaded from the transporting vehicle.

4. Products placed beyond the lines and levels of the required Work.

5. Products remaining on hand after completion of the Work.

6. Loading, hauling and disposing of rejected products including restocking fees.

1.10 SCHEDULE OF UNIT PRICES

Unit Prices					
	Unit	**Quantity**	**Unit Cost**	**Unit Total**	**Subtotal**
1.0 Mobilization/Demobilization	ls	1		$	$
2.0 Job Site Administration	ls	1		$	$
3.0 Site Preparation					
a. Temporary Fencing	ls	1		$	
b. Traffic Control	ls	1		$	
c. Concrete Cut, Demolition & Disposal	ls	1		$	
Subtotal					$
4.0 OSA Natural Attenuation Enhancement Application	ls	1		$	$
5.0 OSA Excavation					
a. Excavation	ls	1		$	
b. Well Abandonment	ls	1		$	
c. Waste Characterization	ls	1		$	
d. Waste Transportation/Disposal	cyd			$	
e. Backfill	cyd			$	
f. Cap Construction	ls	1		$	
Subtotal					$
6.0 Drilling and Well Installation					
a. Drilling Air Sparge Wells	ls	1		$	
b. Drilling Soil Vapor Extraction Wells	ls	1		$	
c. Air Sparge Wellhead Completion	ls	1		$	
d. Soil Vapor Extraction Wellhead Completion	ls	1		$	
Subtotal					$
7.0 Piping Installation					
a. Trenching	lf			$	
b. Air Sparge Piping Installation	lf			$	
c. Soil Vapor Extraction Piping Installation	lf			$	
d. Backfill/Surface Restoration	lf			$	
Subtotal					$
8.0 Treatment Equipment Installation					
a. Carbon Vessels	ls	1		$	
b. Blowers	ls	1		$	
c. Pumps	ls	1		$	
d. Phase Separator	ls	1		$	
e. Treatment System Piping	ls	1		$	
f. Concrete Floor Installation	ls	1		$	
Subtotal					$
9.0 Electrical Installation					
a. Lighting (Interior)	ls	1			
b. Treatment System Control Panel	ls	1		$	
c. Conduit, Wiring, Outlets, Switches	ls	1		$	
d. Instrumentation	ls	1		$	
e. Power Drop	ls	1		$	
Subtotal					$
TOTAL					$

1.11 PAY ITEMS

The Work of this Contract will be paid at the applicable lump sum and unit prices quoted in the Contract Bid Form. All work required by the Contract Documents will be considered to be included in the various bid items indicated, the total of which constitute the Contract Price. The work indicated in the Schedule of Unit Prices and as contracted for in the Bid Form will be measured and paid for as described herein.

1.0 Mobilization/Demobilization

Measurement: Item 1 includes all work required for mobilization and demobilization to complete the work as specified in the contract documents. This item will be measured on a lump sum basis.

Payment: Lump Sum payments for Item #1 will be made in two installments. The initial invoice will include an item for an amount of up to 70% of this line item and the final invoice will include the remainder.

2.0 Job Site Administration

Measurement: Item 2 includes all work required for job site administration. Work included in this item includes the following activities along with other general activities listed in the contract documents that do not fall under specific item numbers:

- Submittal of Shop Drawings
- Equipment Procurement
- Project Management & Record Keeping
- Project Meetings
- Site Protection
- Health & Safety
- Cleaning & Disposal
- Job Trailer & Sanitary Facilities
- Temporary Utilities

Payment: Lump Sum payments for Item #2 will be made in equal installments over the projected length of the project. If the schedule changes without an increase in scope, remaining totals will be divided equally over the remaining time.

3.0 Site Preparation

a. Temporary Fencing

Measurement: Installation of temporary fencing during construction.

Payment: Payment shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for temporary fence installation.

b. Traffic Control

Measurement: Installation of traffic control during construction.

Payment: Payment shall constitute full compensation for all labor, materials, products,

and other costs incurred by the Contractor required for traffic control installation.

c. Concrete Cut, Demolition & Disposal

Measurement: Removal, demolition and disposal of all concrete in the excavation and trenching areas.

Payment: Payment for the this item shall constitute full compensation for all labor, materials, products and other costs incurred by the Contractor necessary to cut, break and dispose of the concrete at the specified locations.

4.0 OSA Natural Attenuation Enhancement Application

Measurement: Item 4 includes all work required for application of Regenesis® HRC-X in the OSA for natural attenuation enhancement . This item will be measured on a lump sum basis.

Payment: Payment shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for HRC-X application.

5.0 OSA Excavation

a. Excavation

Measurement: Measurement for site work shall be on a lump sum basis. Progress payments shall be based on the percentage of site work completed. All site work necessary for the excavation of the OSA soils shall be in accordance with the Technical Specifications and Contract Drawings.

Payment: Payment for site work shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for excavation of the soils in the OSA.

b. Well Abandonment

Measurement: Measurement for well abandonment shall be on a lump sum basis. All well abandonment work shall be in accordance with the Technical Specifications and Contract Drawings.

Payment: Payment for this item shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for well abandonment.

c. Waste Characterization

Measurement: Measurement for the waste characterization of the excavated soils shall be on a lump sum basis. Waste characterization shall be in accordance with the Technical Specifications and Contract Drawings.

Payment: Payment for the waste characterization shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for the sampling and analysis required for waste characterization.

d. Waste Transportation and Disposal

Measurement: Measurement for waste transportation and disposal shall be on a per cubic yard basis. All waste transportation and disposal shall be in accordance with the Technical Specifications and Contract Drawings.

Payment: Payment for the waste transportation and disposal shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for the transportation and disposal of excavated soils.

e. Backfill

Measurement: Measurement for backfilling of the excavation shall be on a per cubic yard basis. All backfilling procedures shall be in accordance with the Technical Specifications and Contract Drawings.

Payment: Payment for the backfilling of the excavation shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required to backfill the excavation.

f. Cap Construction

Measurement: Measurement for the cap construction of the OSA excavation shall be on a lump sum basis. The cap construction shall be in accordance with the Technical Specifications and Contract Drawings.

Payment: Payment for the cap construction shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for the construction of the clay cap.

6.0 Drilling and Well Installation

a. Drilling Air Sparge Wells

Measurement: Measurement for installation of the air sparge wells shall be on a lump sum basis. All work necessary for the installation of the air sparge wells shall be in accordance with the Technical Specifications and Contract Drawings.

Payment: Payment shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for the drilling and installation of the air sparge wells.

b. Drilling Soil Vapor Extraction Wells

Measurement: Measurement for installation of the soil vapor extraction wells shall be on a lump sum basis. All work necessary for the installation of the soil vapor extraction wells shall be in accordance with the Technical Specifications and Contract Drawings.

Payment: Payment shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for the drilling and installation of the soil vapor extraction wells.

c. Air Sparge Wellhead Completion

Measurement: Measurement for the completion of the air sparge wellheads shall be on a lump sum basis. All work necessary for the completion of the air sparge wellheads shall be in accordance with the Technical Specifications and Contract Drawings.

Payment: Payment shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for the completion of the air sparge wellheads.

d. Soil Vapor Extraction Wellhead Completion

Measurement: Measurement for the completion of the soil vapor extraction wellheads shall be on a lump sum basis. All work necessary for the completion of the soil vapor extraction wellheads shall be in accordance with the Technical Specifications and Contract Drawings.

Payment: Payment shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for the completion of the soil vapor extraction wellheads.

7.0 Piping Installation

a. Trenching

Measurement: Measurement for the trenching for air sparge and soil vapor extraction piping shall be on a linear foot basis. All work necessary for the pipe trenching shall be in accordance with the Technical Specifications and Contract Drawings.

Payment: Payment shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for the trenching for the air sparge and soil vapor extraction piping.

b. Air Sparge Piping

Measurement: Measurement for installation of the air sparge piping shall be on a per linear foot basis. All work necessary for the installation of the air sparge piping shall be in accordance with the Technical Specifications and Contract Drawings.

Payment: Payment shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for the installation of the air sparge piping.

c. Soil Vapor Extraction Piping

Measurement: Measurement for installation of the soil vapor extraction piping shall be on a per linear foot basis. All work necessary for the installation of the soil vapor extraction piping shall be in accordance with the Technical Specifications and Contract Drawings.

Payment: Payment shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for the installation of the soil vapor extraction piping.

d. Backfill/Surface Restoration

Measurement: Measurement for installation backfilling for surface restoration of the pipe trenches shall be on a linear foot basis. All work necessary for backfill and surface restoration shall be in accordance with the Technical Specifications and Contract Drawings.

Payment: Payment shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for backfilling and surface restoration of the pipe trenches.

8.0 Treatment System Installation

a. Carbon Vessels

Measurement: Measurement for the carbon vessel installation shall be on a lump sum basis. Measurement for progress payments shall be based on the percentage of work completed. All work shall be in accordance with the Technical Specifications and Contract Drawings. The work of this item shall include receipt and unloading of the Carbon Vessels, placement, support and anchor bolt installation.

Payment: Payment for the carbon vessels shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for the proper placement and testing of the work.

b. SVE Blower and Air Sparge Compressor

Measurement: Measurement for the SVE blower and air sparge compressor installation shall be on a lump sum basis. Measurement for progress payments shall be based on the percentage of work completed. All work shall be in accordance with the Technical Specifications and Contract Drawings. The work of this item shall include receipt and unloading of the blowers, placement, support and anchor bolt installation.

Payment: Payment for the installation of the SVE blower and air sparge compressor shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for the proper placement and testing of the work.

c. Pumps

Measurement: Measurement for discharge pumps shall be on a lump sum basis. Measurement for progress payments shall be based on the percentage of work completed. All work shall be in accordance with the Technical Specifications and Contract Drawings. The work of this item shall include receipt and unloading of the discharge pumps, placement, support and anchor bolt installation.

Payment: Payment for the discharge pumps shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for the proper placement and testing of the work.

d. Phase Separator

Measurement: Measurement for the liquid/vapor phase separator shall be on a lump sum basis. Measurement for progress payments shall be based on the percentage of work completed. All work shall be in accordance with the Technical Specifications and Contract Drawings. The work of this item shall include receipt and unloading of the phase separators, placement, support and anchor bolt installation.

Payment: Payment for the phase separator shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for the proper placement and testing of the work.

e. Treatment Building Piping

Measurement: Measurement for the treatment building piping shall be on a lump sum basis. Measurement for progress payments shall be based on the percentage of work completed. All work shall be in accordance with the Technical Specifications and Contract Drawings. The work of this item shall include purchase, receipt and unloading of the piping and connections, placement, support and anchoring.

Payment: Payment for the Treatment Building Piping shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for the proper placement and testing of the work.

f. Concrete Floor Installation

Measurement: Measurement for installation of the concrete floor in the water tank building shall be on a lump sum basis. All work necessary for the installation of the concrete floor shall be in accordance with the Technical Specifications and Contract Drawings.

Payment: Payment shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for the installation of the concrete floor.

9.0 Treatment Plant Electrical Installation

a. Lighting (Interior)

Measurement: Measurement for the Interior Lighting shall be on a lump-sum basis. Measurement for progress payments shall be based on the percentage of work completed. All work shall be in accordance with the Technical Specifications and Contract Drawings. The work for this item shall include all lights, fixtures, supports, conduit, wiring, grounding, connections, switches, and labeling for those lights to be installed inside of the treatment plant building.

Payment: Payment for the Interior Lighting shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for the proper placement, testing, and inspection of the work.

b. Treatment System Control Panel

Measurement: Measurement for the Treatment System Control Panel shall be on a lump-sum basis. Measurement for progress payments shall be based on the percentage of work completed. All work shall be in accordance with the Technical Specifications and Contract Drawings. The work for this item shall include receipt and unloading of the control panel, placement, supports, connections, and testing.

Payment: Payment for the Treatment System Control Panel shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for proper placement, testing, and inspection of the work.

c. Conduit, Wiring, Outlets, and Switches

Measurement: Measurement for the conduit, wiring, outlets, and switches within the Treatment Plant Building shall be on a lump-sum basis. Measurement for progress payments shall be based on the percentage of work completed. All work shall be in accordance with the Technical Specifications and Contract Drawings. The work of this item shall include supplying and installing all conduit, wiring, outlets, switches, pull boxes, supports, and making all connections to control panels, instrumentation, lights, motors, and fans.

Payment: Payment for this item shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for the proper placement, testing, and inspection of the work.

d. Instrumentation

Measurement: Measurement for Instrumentation shall be on a lump-sum basis. Measurement for progress payments shall be based on the percentage of work completed. All work shall be in accordance with the Technical Specifications and Contract Drawings. The work for this item shall include supplying and installing all instrumentation associated with the treatment system.

Payment: Payment for this item shall constitute full compensation for all labor, materials, products, and other costs incurred by the Contractor required for the proper placement, testing, and inspection of the work.

e. Power Drop

Measurement: The contractor shall supply and install all the equipment to provide power to the treatment building, equipment and controls. Work shall be in accordance with the Technical Specifications and Contract Drawings. Measurement shall be based on the total completed installation in place. An installation shall be considered complete when all power is hooked up, tested, inspected and operating properly as specified.

Payment: Payment for this item shall constitute full compensation for all labor, material, products, and other costs incurred by the Contractor required for the proper placement, testing, and inspection of the work.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION 01 22 00

SECTION 01 23 00

ALTERNATES

PART 1 - GENERAL

1.1 SCOPE

The Contract will be awarded on the basis of the Base Proposal Sum stated on the Proposal and Contract. Inclusion of Alternative prices in the bid is the responsibility and sole risk of the Contractor.

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTALS

A. All documentation submitted in regards to Alternate prices shall be in accordance with Contract Documents and Section 01 33 00.

B. Alternate prices are required to be filled in separately from the Bid Form and to be clearly identified by the Contractor.

C. Alternate prices are to be submitted with the Bid Form.

PART 2 - PRODUCTS

(Not Used)

PART 3 – EXECUTION

B. Coordinate pertinent related Work and modify surrounding work as required to complete the project for each alternate.

B. Contractor shall state the amount to be added to or deleted from the Base Proposal Sum to provide all labor and materials required to complete each alternative.

END OF SECTION 01 23 00

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SCOPE

Manufacturers or suppliers of materials and equipment may offer an alternative product to the Contractor and request that alternatives to specified products be considered equal. Inclusion of such alternatives in the bid is the responsibility and sole risk of the Contractor.

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTALS

A. All documentation submitted in regards to Substitutions shall be in accordance with Contract Documents and Section 01 33 00.

B. The Contractor's offers of substitution shall be made in writing to the Engineer, and shall include sufficient data to enable the Engineer to assess the acceptability of the material or equipment for the particular application and requirements

C. Alternate prices for Substitutions are required and to be clearly identified by the Contractor. Any cost differential associated with a substitution shall be stated in the request for substitution and the Contract Documents shall be modified by a Change Order.

PART 2 - PRODUCTS

(Not Used)

PART 3 – EXECUTION

A. The Owner will consider offers for substitution only from the Contractor and will not acknowledge or consider such offers from suppliers, distributors, manufacturers, or subcontractors.

C. If the offered substitution necessitates changes to or coordination with other portions of the Work, the data submitted shall include Drawings and details showing such changes.

D. The Contractor agrees to perform these changes as part of the substitution of material or equipment at no additional cost to the Owner.

E. Within 30 calendar days after receipt of the offer of substitution, the Engineer will review the material submitted by the Contractor and advise the Contractor of objections, if any, to the proposed substitution or if further information is required.

F. Upon notification by the Engineer of objections, the Contractor shall either provide material or equipment that complies with project Specifications or furnish requested additional information.

G. The Owner, at his sole discretion, reserves the right to reject the proposed substitution. If the proposed substitution is rejected, the Contractor shall provide the specified material or equipment in these Contract Documents.

H. Acceptance by the Owner of the proposed substitution shall not relieve the Contractor from responsibility for the efficiency, sufficiency, quality, and performance of the substitute material or equipment, in the same manner and degree as the material and equipment specified by name.

I. For equipment items listed in the Bidding and Contract Documents, substitutions will not be considered until after a notice of award has been issued. Only one offered substitution will be considered by the Engineer and should the offered substitution be rejected, the Contractor shall supply equipment and material of one of the manufacturers or suppliers designated in the specifications.

END OF SECTION 01 25 00

SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SCOPE

The Owner may order changes by addition, deletion, or modification of the Work at any time without invalidating the Contract through the issuance of field orders and/or change orders. The Owner reserves the right to Contract with any person or entity other than the Contractor for any or all extra Work authorized by change orders. In the event that the Owner Contracts with a person or entity other than the Contractor for such extra Work, the Owner shall be responsible for coordinating the efforts of the Contractor and the other person or entity, in order to avoid, insofar as practicable, any interference with the Contractor's Work.

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTALS

A. All documentation submitted in regards to Contract Modifications shall be in accordance with Contract Documents and Section 01 33 00.

PART 2 - PRODUCTS

(Not Used)

PART 3 – EXECUTION

A. Bid Clarifications and Interpretations

1. Requests from bidders for clarifications to the Contract Documents shall be submitted in writing to the Engineer for which a response shall be issued if received by the Engineer on or before 10 calendar days prior to the deadline for submission of bids. Oral requests for clarifications will be accepted only during the pre-bid conference. Any written request received by the Engineer less than 10 calendar days before the deadline for submission of bids may be considered solely at the Owner's discretion.

2. Engineer will issue, with reasonable promptness, such written clarifications or interpretations of the requirements of the Contract Documents (in the form of Drawings or otherwise) as Engineer may determine necessary, which shall be consistent with or reasonably inferable from, the overall intent of the Contract Documents. If Contractor believes that a written clarification or

interpretation justifies an increase in the Contract Price or an extension of the Contract Time, Contractor may make a claim.

B. Engineer may authorize, in writing, minor changes in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price of the Contract Time and are consistent with the overall intent of the Contract Documents. These may be accomplished by a Field Order and will be binding on Contractor who shall perform the Work involved promptly. If Contractor believes that a Field Order justifies an increase in the Contract Price or an extension of the Contract Time, Contractor may make a claim.

C. Field Orders

1. By field order, the Engineer may make minor changes within the scope of the Work as long as such changes are reasonable. The Contractor is not entitled to extra compensation or an extension of the Contract Time for such minor changes that are within the scope of the contract, nor is a change order required.

2. Such changes shall be effected by written field order as set forth in Section 01 26 39 of the Bidding and Contract Document and shall be binding on the Contractor. The Contractor shall carry out such written orders promptly.

D. Change Order

1. A change order is a written order from the Engineer, issued after the execution of the Contract, authorizing a change in the Work and a related adjustment in the Contract price or the Contract time.

2. Only the Engineer is authorized to sign a change order on behalf of Owner.

3. The Contract price and the Contract time may be changed only by a change order.

4. The change order form is set forth as Section 01 26 63 of the Bidding and Contract Documents. Any change order waiving any general condition shall be approved by the Owner's attorney.

5. If the Engineer determines that a change order requires the Contractor to do Work that is a substitute for other Work originally called for in the bid proposal, and if the Engineer determines that the change order does not require the Contractor to use substantially more materials or labor than were originally called for in the bid proposal, then, and to that extent, the Engineer shall not allow the Contractor extra compensation. Similarly, if the changes required by any change order can be implemented without any delay in completion, no time extension shall be granted. Instead, reasonable reductions in the Contract Price and/or Contract Time shall be established in the change order.

6. If the Contractor believes that a change order will significantly affect the contract schedule of performance, and require the contractor to spend more time on the project than was earlier anticipated, the Contractor shall petition the Engineer for a time extension within 10 days after service of the change order.

7. If any instruction of the Engineer or any condition of the Work appears to the Contractor to require a change in the Work for which the Contractor should receive extra compensation, the Contractor shall make a written request to the Engineer for a change order. Except for claims by the Contractor arising from design error caused by the Owner or an Engineer hired by the Owner or an agent or employee thereof, no extra compensation shall be authorized for Work performed more than 20 days before a written request for a change order is received by the Engineer. The change order shall reflect the agreement of the Contractor and the Owner to a Contract price adjustment for the change. On unit price Contracts, the change order shall indicate the unit prices that apply. The cost or credit to the owner resulting from a change order shall be determined in one or more of the following ways, the method of determination to be as directed by the Engineer:

    a. By mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data; or

    b. By actual costs as determined Cost Adjustments for Extra Work as described in Item E below.

E. Cost Adjustments for Extra Work

1. The Contractor may be called upon to perform extra Work or force account Work not provided for in the bid proposal or other Contract Documents, but is essential to the satisfactory completion of the Contract.

2. Extra Work is Work not provided for in the Contract Documents but is found desirable to include in the Contract because of timing, mobilization, or other factors.

3. Force account Work is Work not bid upon by the Contractor but is essential to the satisfactory completion of the Contract within its intended scope.

4. The Contractor shall be awarded additional compensation for extra or force account Work provided by change order. As used hereafter, extra Work shall refer to both extra and force account Work. The Owner shall issue a change order (Section 01 26 63 of the Bidding and Contract Documents) describing the extra Work to be performed, and shall determine a price for the extra Work if this is acceptable to the Contractor. If the parties cannot agree on a price for the extra Work, the Contractor shall immediately establish special accounts designed to accumulate the Contractor's own actual costs and credits

associated with the extra Work. Adjustments in the contract price for extra Work shall be calculated based on the Contractor's own actual costs. The Contractor shall be paid for such extra Work according to the following procedures:

a. Labor

The Contractor will receive the rate of wage agreed upon in writing before beginning the extra Work. If the Owner and Contractor are unable to agree upon an acceptable rate of wage before beginning the extra Work, the Contractor shall perform the Work and will be paid at the hourly rates as certified by payroll records, plus 12 percent. The certified payroll record shall include the employee's hourly rate and all fringe benefits resulting from collective bargaining units (trade unions). The 12 percent loading factor shall not be applied to the fringe benefits. The 12 percent loading factor shall include such items as overhead, bonds, insurance taxes, and profit. Only the employees directly involved in the extra Work shall be included. Project superintendents or foremen, who generally direct the extra Work but who have overall project responsibilities, shall not be included.

b. Materials

For materials accepted by the Owner and used in the Work, the Contractor shall receive the actual cost of such materials, including transportation charges (exclusive of equipment rentals as set forth below). The Contractor shall furnish invoices to the Owner for all materials used and transportation charges. If the materials used in performing the extra Work are taken from the Contractor's stock, then in lieu of invoices, the contractor shall furnish an affidavit, certifying that such materials were taken from its stock, that the quantity claimed was actually used in the Work, and that the price and transportation claimed represent the actual cost to the Contractor. The Contractor shall be paid an additional 8 percent of the sum of all materials used to cover overhead and profits, unless otherwise agreed by the parties.

c. Equipment Rental Rates

The Contractor shall be paid according to rental rates agreed upon by the parties in writing before the extra Work is begun for any machinery or special equipment (other than small tools) necessary for performing the extra Work. The rental rates shall include fuel, lubricants, and the costs of transporting the special equipment to the site. Operators will be paid for separately as provided in Section 807 Part A of the General Conditions.

d. Other Miscellaneous Expenses

The Contractor shall be reimbursed for the actual cost of other services or expenditures including, without limitation, as agreed upon by the parties before the extra Work is begun, use of materials testing laboratories, employment of design professionals and surveyors, bond premiums, and any other cost directly related to accomplishment of the extra Work but not provided for in other categories in this Section. Additional allowance shall not be made for overhead, general superintendence, the use of small tools, further profit, or any other cost for which no specific allowance is provided herein.

F. Eliminated Items

1. Should any item contained in the bid proposal be found unnecessary for the proper completion of the Work, the Owner will, by change, order eliminate such item from the Contract, and reduce the Contract price, insofar as is possible, according to the prices set forth in the bid proposal.

2. If any change order shall cause the loss of any Work or materials already furnished by the Contractor under the terms of the original Contract, the Contractor shall be reimbursed for the actual cost of such Work and the net cost of salvaging such materials. The Owner may purchase any such materials at the actual cost to Contractor.

3. Except as provided above, or unless otherwise agreed by the parties, the Contractor shall not receive additional allowance for any increased expense or loss of anticipated profits resulting from such eliminated items. However, the Contractor shall be awarded transportation, storage, installation, and salvage costs that have been incurred for eliminated items, provided the Contractor can provide invoices or receipts or other evidence that such costs were incurred.

END OF SECTION 01 26 00

SECTION 01 26 39

FIELD ORDER

OWNER'S PROJECT NO. _____ No. _____
ENGINEER'S PROJECT NO. _____
PROJECT: SER Site
Rockford, IL
OWNER: _____
ENGINEER: *SECOR* International Incorporated
CONTRACTOR: _____

The Contractor is hereby authorized and instructed to effect the Work as follows:

_____

_____

_____

_____

_____

_____

Attachments:_____

_____

This form shall be used to authorize minor variations in the Work from the requirements of the Contract Documents which do not include an adjustment in the Contract Price or the Contract Time and are consistent with the overall intent of the Contract Documents.

In an emergency situation, a Field Order can be utilized for emergency instructions affecting Contract provisions only if followed by a formal Change Order.

_____ _____
Date Resident Project Representative

_____ _____
Date Contractor's Authorized Representative

Distribution: Contractor
Engineer
Owner

SECTION 01 26 63

CHANGE ORDER

CHANGE ORDER No. _____

PROJECT: SER Site
Rockford, IL

DATE OF ISSUANCE: _____

CONTRACTOR: _____

OWNER'S PROJECT NO.: _____

ENGINEER: _____

ENGINEER'S PROJECT NO.:

You are directed to make the following changes in the Contract Documents:
Description:

Purpose of Change Order:

Attachments:

CHANGE IN CONTRACT PRICE:	CHANGE IN CONTRACT TIME:
Original Contract Price $_____	Original Contract Time _____ days or date
Previous Change Orders No. ___ to No. ___ $_____	Net change from previous Change Order _____ days
Contract Price Prior to this Change Order $_____	Contract Time Prior to this Change _____ days or date
Net Increase (Decrease) of this Change Order $_____	Net Increase (decrease) of this Change _____ days
Contract Price with all approved Change Orders $_____	Contract Time with all approved Change _____ days or date

RECOMMENDED:	APPROVED:	APPROVED:
By: _____ Engineer	By: _____ Owner	By: _____ Contractor

CHANGE ORDER INSTRUCTIONS

A. GENERAL INFORMATION

This Change Order Form shall be used for contract changes that affect Contract Price or Contract Time. Changes that have been initiated by a Work Directive Change must be incorporated into a subsequent Change Order if they affect Price or Time.

For supplemental instructions and minor changes not involving a change in the Contract Price or the Contract Time, a Field Order shall be used.

B. COMPLETING THE CHANGE ORDER FORM

Engineer will initiate the form, including a description of the changes involved and attachments based upon documents and proposals submitted by Contractor, or requests from Owner, or both.

Once Engineer has completed and signed the form, all copies will be sent to Contractor for approval. After approval by Contractor, all copies will be forwarded to Owner for approval. Engineer will distribute executed copies after approval by Owner.

END OF SECTION 01 26 63

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SCOPE

This section describes the requirements for Project Management and Coordination. This section supplements the requirements stated in the Contract Documents. If any inconsistencies between this section and contract documents are encountered, Contract Document requirements will control.

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTALS

All documentation submitted in regards to Project Management and Coordination shall be in accordance with Contract Documents and Section 01 33 00.

1.4 APPLICABLE STANDARDS

(Not Used)

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

A. The Contractor shall provide and maintain continually on the Work site a superintendent for all Work being performed under the contract.

1. The Contractor shall designate the superintendent, who shall be authorized to act on behalf of the Contractor in all matters related to the contract.

2. Within five days after the execution of the Contract Documents, the Contractor shall inform the Engineer in writing of the home and residence address and residence telephone number of the person designated as the superintendent.

3. The Engineer may, for cause, require that the person designated superintendent be replaced or may permit such replacement if the superintendent ceases to be employed by the Contractor or becomes sick or disabled. The superintendent shall be present continuously or immediately available at the Work site until the Work has been completed.
4. The superintendent shall thoroughly understand these detailed specifications and Contract Drawings and shall fulfill any instructions from the Engineer.

5. The superintendent shall keep a daily log of the job performed and forward copies of such log to the Engineer on a weekly basis. The log shall contain, at a minimum, a legible summary recitation of the Work completed each day, the beginning and ending temperatures and weather conditions, any unusual or delay-causing events and any instructions requested or received. The log shall also list the subcontractors working identify major deliveries of equipment and materials and job site.

B. The Contractor shall provide a full-time, on-site Health and Safety officer to maintain, review and implement the Site Health and Safety Plan.

C. Phasing of Work shall be clearly established and verified with the Engineer and Owner prior to commencing Work in any area. No work shall begin until authorized by the Engineer.

D. Prior to beginning Work, the Contractor shall meet with the Engineer and the Engineer's designee and arrange the schedule for the project. Once the project is started, it shall be carried to completion without delay.

E. Coordinate all work under this contract with the Engineer, the Engineer's designee, and other landowners where work is to be conducted during the execution of this project.

F. Obtain all necessary permits prior to the start of construction activities.

G. Maintain up-to-date progress reports.

H. Maintain the project site in a neat condition.

I. Coordinate with all identified utilities and notify the appropriate utility owners when the excavation is scheduled in areas that may affect existing utilities.

J. Any building utility service interruptions or outages required by the Contractor in performing the Work shall be prearranged with the staff of the Engineer and the Owner, and shall occur only during those scheduled times.

END OF SECTION 01 31 00

SECTION 01 32 00

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SCOPE

This section describes the requirements for the following:

A. Preparing and maintaining a construction schedule.

B. Preparing and maintaining communication records.

C. Preparing and maintaining construction progress reporting.

D. Preparing and maintaining project record documents.

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTAL CONTROL

A. All documentation submitted in regards to Project Management and Coordination shall be in accordance with Contract Documents and Section 01 33 00.

B. No later than five calendar days after receipt of the Notice of Award, but before beginning the Work, Contractor shall submit to the Engineer for approval a construction schedule, including a schedule of values.

1.4 APPLICABLE STANDARDS

(Not Used)

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

A. Construction Schedule

1. Initially acceptable schedules are due before the contract is finalized.

2. Contractor shall prepare the construction schedule in bar chart form to schedule and control work. The bar chart will show dates of the proposed

commencement and completion of each of the various subdivisions or units of work required under the Contract.

3. Items in the schedule shall be arranged in the order and sequence in which they will be performed. The schedule shall conform to the working time and time of completion established under the terms of the Contract, and shall be subject to modification by the Engineer.

4. Individual activity bars shall not represent more than one craft, trade, or unit of work. Activity arrows shall be used to represent work outside the Site, such as shop drawing preparation, order and delivery periods, shop work and fabrication, and average inclement weather for the period covered (if applicable), as well as work at the Site.

5. The bar chart diagram shall be drawn to a time scale, shown along the base of the diagram, using an appropriate measurement per day with weekends and holidays indicated.

6. Each activity shall be uniquely numbered. Each activity shall be identified by a descriptive term indicating the work represented and an estimated duration for the accomplishment of the activity.

7. A tabular list shall be provided listing all activities in approximate calendar order by start and finish numbers, showing activity description, subcontractor responsibility, start and finish dates, work days assigned to activity, and total man days remaining to complete the activity. The numbers, descriptions, and days shown shall be identical with those shown on the associated bar chart.

8. The construction progress schedule shall be continuously updated and, if necessary, redrawn upon the first working day of each month or upon issuance of any Change Order which substantially affects the scheduling.

9. A copy of the most recently updated construction progress schedule shall be posted in the Contractor's job office, and copies of all out-of-date schedules shall be kept at the job office at all times for perusal by the Engineer.

10. Copies (three (3) prints or one (1) electronic) of newly updated schedules shall be forwarded to the Engineer, as directed, immediately upon preparation.

11. The Contract time period for performance is based on days excluding weekends and Owner observed national holidays. Each date or time period specified in the Contract Documents shall be deemed material and of the essence to the Contract. The Contract time for performance shall run from the date on which the notice to proceed is issued, until the date specified for completion. The Contractor must begin Work no later than fifteen (15) days after the notice to proceed.

12. If this Contract specifies that construction will be completed within a certain

number of consecutive calendar days, it contemplates that all days, whether weekend, holiday, or days of normal inclement weather will be included in the contract time. Unless the term calendar days is used, the term shall refer to a day between Monday and Friday, excluding Saturdays, Sundays, or Owner-observed holidays.

13. If the Contractor believes it necessary to work on Saturdays, Sundays, holidays or from 5:00 p.m. to 7:00 a.m., the Contractor shall make prior arrangements with the Engineer and receive written approval before the Work commences. Owner, at his sole discretion, may approve or reject such request and its approval may be revoked by the Engineer for any overtime, including, without limitation, failure to maintain adequate equipment and lighting at night for the proper implementation, control, and inspection of the work. If work is done without the Engineer's prior approval and as a result the Engineer is unable to adequately inspect the Work, the Work done during those periods of time may be declared defective solely on the grounds that it was not subject to proper inspection. No extra money will be paid to the Contractor by the Owner due to labor overtime or other increased costs of performing the Work on Saturdays, Sundays, holidays, or at night. If inspectors or Engineer charge overtime or other incidental expenses for performing inspections on Saturdays, Sundays, holidays, or at night, the Contractor shall be responsible to pay for all such charges, and shall not be granted a Contract Price increase for such charges.

14. The Contractor specifically waives any and all claims against the Owner and Engineer for damages resulting from any hindrance or delay caused by the circumstances enumerated below that impede the Contractor's performance, whether or not caused by the Owner or Engineer. The Contractor may instead be granted time extensions as expressly provided below for which the Owner will not claim damages, provided that the hindrance or delay is beyond the reasonable control of the Contractor. The Contractor shall notify the Engineer by telephone within 24 hours and advise the Engineer in writing of any Work delays within five (5) days from the beginning of the delay to explain the cause(s) and the expected duration of the delay, and shall file a written claim for an extension of time within five days after the period of delay as ceased. For any claim that would impact the commencement or completion of construction, Contract Time extensions by the Owner would be subject to the approval of EPA that the delay is caused by a "Force Majeure" event pursuant to the Administrative Order on Consent or other agreement. Force Majeure, as defined in the Administrative Order on Consent or other agreement, is any event arising from causes beyond the control of the Owner or its Contractors, subcontractors, consultants, or agent which delays or prevents the performance of any obligation under the Administrative Order on Consent or other agreement which could not have been overcome by due diligence.

15. If the Contractor fails to timely notify the Engineer of any such delay, the Contractor shall be deemed to waive any right to request a time extension, and may be held in default on the Contract. All time extensions shall be made by written change order. In the event that the Owner grants a Contract

extension, the Owner shall not be responsible for overtime or any other costs charged to the Contractor or its subcontractors that result from granting the time extension if the delay could have been avoided by Contractor. Additionally, the Owner may recover any actual loss, liability, or expense resulting from such time extension. The Engineer will grant time extensions, by written change order, beyond the original schedule of performance for the following reasons only:

a. Events beyond the Contractor's reasonable control.

i. A suit or other legal action against the Owner that causes a delay in the Work (other than a suit or legal action asserted by the Contractor) will entitle the Contractor to an equivalent extension of time for a period of time by which the contractor's completion is actually delayed unless the period of such delay exceeds three months. When such period is exceeded, the Owner will, upon request by the Contractor in writing, elect either to terminate the Contract or to grant a further extension of time, whichever shall at that time appear most advantageous to the Owner and solely within Owner's discretion.

ii. A suspension of Work or stop work order that is related to a breach of a Contract condition or negligence of the Owner or an Owner employee or agent, or any other Contractor employed by the Owner, or a strike, war, flood, fire, epidemic, or unusual delay in transportation or other cause beyond the Contractor's reasonable control that, in the opinion of the Owner, justifies delay of the Contractor's performance. In that event, the Owner will grant a reasonable time extension equivalent to the actual delay in the completion of the Work. This Section shall not govern cases where the Work is suspended for the Owner's convenience by written change order. Such cases will be governed by Section 1003 of the General Conditions. However, the Contractor shall, under any circumstances, notify the Owner no later than give days after the beginning of such a delay of the occurrence causing delay. The Contractor has the burden to prove the events that caused delays, that the Contractor made timely requests for time extension pursuant to this Section, that Contractor is entitled to an extension.

iii. If in the opinion of the Owner any delay is caused by events within the reasonable control of the Contractor that could have been overcome by due diligence, then no time extension will be allowed. No such extension shall be made for delays that the Contractor could have reasonably anticipated and avoided. Stop work orders due to improper Work or otherwise caused by the Contractor's acts or omissions also shall not be cause for extension of time.

b. If the volume of specified Work measured in dollars is increased by written change order over the total value shown in the contractor's bid proposal at the time that the contract is awarded, the Contractor may be granted an extension of the Contract Time equal to the resulting

additional time for completion, if any, if the contractor requests a time extension in writing, within 10 days after service of the change order. The Contractor may appeal the Engineer's decision pursuant to Section 120, Contract Grievance Appeal Procedure, of the General Conditions.

c. If the Contractor believes that a Contract extension should be granted because of delays caused by abnormal weather, the Contractor shall request a Contract extension in writing from the Engineer. The Engineer shall be the sole judge of whether to grant a time extension for delays caused by abnormal weather. The Contractor must request a contract extension for delays caused by abnormal weather in writing within 7 days after the day on which the Work was delayed by abnormal weather, or else the contractor shall be deemed to have waived any right to a Contract extension. No extension of the contract Time shall be allowable if the Contractor is able, notwithstanding the weather, to proceed with other Work or if the Work had been delayed into inclement weather seasons through the fault of the Contract and shall not exceed the time by which completion of the work has actually been delayed.

B. Communication Records

1. The Contractor shall maintain a complete file of all records, communications, and other documents pertaining to the Contract at its main office. The Contractor shall maintain such records for a period of 6 years after the date of completion of the Contract, and for such longer period as may be necessary to resolve any matters that may be pending at that time. Contractor's correspondence and written communications to Owner, Engineer and their agents and employees shall be serially and sequentially numbered

2. Subject to a requirement of confidentiality in the treatment of all confidential financial data, the Contractor shall permit the Owner to audit or inspect its records during the term of the Contract, for a period of 6 years following the completion of the Contract, and for such further periods as may be necessary to resolve any matters that may be pending at that time. Upon completion of the 6-year period and before any destruction, the Owner shall be notified and given 30 calendar days to request an opportunity to inspect and copy all pertinent records and documents. The purpose of this provision is to assure the Contractors' compliance with the terms of the Contract and to evaluate the Contractor's costs and performance under the Contract.

3. The superintendent shall keep a daily log of the job performed and forward copies of such log to the Engineer on a weekly basis. The log shall contain, at a minimum, a legible summary recitation of the Work completed each day, the beginning and ending temperatures and weather conditions, any unusual or delay-causing events and any instructions requested or received. The log shall also list the subcontractors working identify major deliveries of equipment and materials and job site.

4. The superintendent shall be the normal recipient of Work site communications from the Engineer. Important communications from the Engineer shall be in writing and shall be made by Field Order (Section 01 26 39 of the Bidding and Contract Documents), or a reasonable facsimile thereof. Other important communications from the Contractor to the Owner shall also be in writing. Further, the superintendent shall designate agents at the site to receive such communications when the superintendent is away from the site. When the superintendent is absent, such persons shall be authorized to act immediately on emergency communications given by the Engineer. If the Engineer issues an emergency communication to the Contractor, but there is no authorized representative of the Contractor able to act on the emergency communication, the Engineer may take whatever action is necessary to deal with the emergency, at the Contractor's cost. If the Owner finds it necessary to communicate at the Work site with Contractor personnel authorized to receive such communications and none are available to receive such communications, the Owner may suspend the Contractor's operations at the Work site that are affected by the communications until such communications can be accomplished.

5. If the Contractor requests clarification or interpretation of any Contract Documents the Contractor shall immediately notify the Engineer in writing. The Engineer shall issue a written response to the Contractor within a reasonable time following the Contractor's request. If the Engineer fails to issue a written reply within a reasonable time and the Contractor is actually delayed in the Completion of Work, the Contractor shall be granted a time extension, provided the work in question is on the critical path of the construction schedule. The Contractor shall not work on any part of the Work that is under consideration by the Owner until the Engineer issues a written notice to continue. If the Contractor proceeds with Work that is under consideration by the Owner before receipt of the written reply from the Engineer, the Contractor shall replace this Work if the Engineer determines that the Work was not performed in accordance with the Contract Documents and the written reply. The Contractor shall bear all costs of removal and replacement of the nonconforming work.

C. Construction Progress Reporting: The Contractor shall document project progress, monthly progress reports that shall include the following items:

1. A summary of activities completed during the reporting period;

2. A summary of key correspondence or communications transmitted during the period;

3. An evaluation of project progress with respect to the schedule, including identification of any schedule delays or activities that are ahead of schedule;

4. A current status of Project Record Documents (described in Part D below);

5. A discussion of any significant problems and recommended or implemented solutions or improvements;

6. A summary of activities planned for the next period; and

7. A summary comparison of costs expended to date compared to total project budget. These reports shall be delivered to Engineer by the fifth calendar day in the month following the reporting period.

D. Project Record Documents

1. On receipt of the job set described in this section, Contractor shall identify one set of the Contract Documents with the title "RECORD DOCUMENTS - JOB SET."

2. Entries on job set shall be made in erasable colored pencil. Record the dates of all entries, and "cloud" all field changes and revisions.

3. Contractor shall make all entries, approved by the Engineer, in other pertinent documents.

4. Contractor shall maintain the job set of Record Documents protected from deterioration, loss and damage. On completion of the Work, transfer all recorded data to the final Project Record Documents.

5. Contractor shall maintain the job set of Record Documents for entry of new data and for review by Engineer until the transfer of the data onto Project Record Documents.

6. Contractor shall maintain the job set in Contractor's field office.

7. The purpose of the final Project Record Document is to provide factual information regarding all aspects of the work and thereby enabling future modification or repair of the work without lengthy and expensive site measurement, investigation, and examination.

8. If the Documents have been kept clean during the progress of the Work, and if entries have been orderly to the written approval of the Engineer, the Job Set of those Documents, shall be accepted as Final Record Documents.

9. Contractor shall submit the completed set of Project Record Documents to the Engineer, as described in this section.

10. Engineer shall review, and return with comments within ten (10) days of receipt.

11. Contractor will make required changes, and on final completion, promptly deliver the final Project Record Documents to the Engineer.

12. The Contractor shall have no responsibility for recording changes in the Work subsequent to Final Completion, except for changes resulting from work performed under these Contract Documents.

13. Contractor shall delegate the responsibility for maintenance of Record Documents to a single Contractor's designate.

14. Contractor's designate shall thoroughly coordinate with the Engineer changes within the Record Documents, making adequate and proper entries on each page of the Technical Specifications, each sheet of Contract Drawings, and other Documents where such entry is required to properly show the change.

15. The Engineer's approval of the current status of Project Record Documents is a prerequisite to progress and final payments

16. Prior to submitting the request for final payment, the Contractor shall submit the final Project Record Documents to the Engineer.

END OF SECTION 01 32 00

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SCOPE

A. This section describes the requirements for preparation and submission of shop drawings, schedules, reports, manufacturer's literature and technical data, inspection and test certificates, maintenance and instruction manuals, and as-built information.

B. Health and Safety submittals are specified in Section 01 35 29.

C. Project record document submittal requirements are specified in Section 01 32 00

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTAL CONTROL

A. Within five calendar days after receipt of the Notice to Proceed, submit to the Engineer a control document listing and scheduling all required submittal items. List such items as shop drawings, manufacturer's literature, certificate of compliance, material samples, and guarantees.

B. The document shall schedule, for each item, the projected need dates for procurement. Coordinate the scheduling with the progress schedule. Review the listing no less frequently than every 30 days and take appropriate action to maintain an effective system.

C. Provide within fifteen (15) calendar days after the Notice of Award, but prior to commencement of work, all data substantiating a request for a substitution of an "or equal" item.

1.4 SUBMITTALS

A. Shop Drawings, Equipment Data and Manufacturer's Literature

1. Limit submittal items to one specification section per submittal. Submit for each item as required in the Technical Specifications. Subcontractors shall make submittals through the Contractor. Accompany each submittal by an acceptable transmittal form identifying the following information as applicable:

Project Name
Date
Specification Section(s)

Drawing Number(s)
Subcontractor Name
Supplier/Vendor Name
Manufacturers Name

Provide space on each drawing sheet or document set for Contractor and Engineer review stamps.

2. Submit for approval all Shop Drawings, certificates of compliance and/or equipment lists, samples or other information called for under the various heading of these specifications. If determined acceptable by the Engineer, each copy of the submittal shall be identified as having received such review by being so marked and dated. Contractor shall make any corrections required by the Engineer.

3. Contractor shall transmit five (5) copies of each required submittal to the Engineer. Deliver to Engineer's project office. Two copies will be returned to Contractor after Engineer review.

4. Contractor's Responsibility: Stamp Shop Drawings, product data, and samples with Contractor's stamp certifying it has been coordinated and checked by Contractor for completeness and compliance with the Contract Documents. Clearly note proposed deviations from Contract Documents on submittals. Contractor is responsible for quantities and dimensions.

5. Shop Drawings: Show in detail, at appropriate scale, materials, dimensions, thicknesses, methods of assembly, attachments, relation to adjoining Work, and other pertinent data and information. In checking shop drawings, verify dimensions and field conditions, and check and coordinate shop drawings of any section or trade with requirements of other sections or trades as related thereto, as required for proper and complete installation of Work.

6. Product Data: To identify pertinent products or models, show performance characteristics, capacities, dimensions, and required clearances, wiring or piping diagrams, and controls. Modify standard drawings, documents or diagrams to delete information not applicable to the Work; supplement with information specifically required for the Work. When specified in individual Technical Specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Engineer in quantities specified for equipment and product data. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

7. Inspection and Test Certificates: One (1) signed original and three (3) copies of each inspection and test certificate required for demonstrating proof of compliance of materials and equipment with Technical Specification requirements shall be transmitted to Engineer. Each original shall be signed by an official authorized to certify on behalf of the manufacturing or testing company. Inspection and test certificates shall be promptly submitted to Engineer on receipt by Contractor.

8. Samples: Where not submitted in standard containers bearing manufacturers descriptive labels and printed application instructions, furnish with such labels and instructions.

9. Additional Data: Limited to specific data requested by Engineer under various Technical Specification sections for information and record purposes only. Stamp submittals with Contractor's stamp as specified for shop drawings, product data, and samples.

10. Field Conditions: Prepare composite shop drawings and installation layouts, when required, to depict proposed solutions for tight field conditions. Coordinate in field and with affected subcontractors for proper relationship of Work of other trades based on field conditions.

B. Engineer's Review

1. General: Except for color, finish, and other aesthetic matters left to Engineers decision by Contract Documents, Engineer's review of submittals is only for Owner's convenience in following the Work and does not relieve the Contractor from responsibility from deviations from requirements of Contract Documents. Do not construe Engineer's review as a complete check nor relief from responsibility of errors of any sort in shop drawings or schedules, or from necessity of furnishing the Work required by Contract Documents which may not be shown on shop drawings or other submittals. Engineer's review of a separate item does not indicate review of complete assembly in which it functions.

2. Submittals: Not stamped by Contractor, and submittals which, in Engineer's opinion, are incomplete, contain numerous errors, or have not been checked or have only been checked superficially will be returned for resubmittal.

3. Processing: Engineer will review submittals with reasonable promptness and will return them to Contractor with Engineer's stamp clearly indicating the adequacy of the submittal, and the need for revisions, resubmittals or other actions as appropriate. Notations by Engineer which increase contract cost or time of completion shall be brought to Engineer's attention before proceeding with the Work.

4. If submittal is returned as unsatisfactory by the Engineer in writing, the Contractor shall resubmit the corrected material in the same quantity for approval within 5 calendar days after receipt of returned submittal. Acceptance by the Engineer in writing shall not relieve Contractor from responsibility for errors and omissions in the submittals.

C. Proposed Equipment and Products List

1. Within fifteen (15) calendar days after date of Notice of Award, but before beginning Work, submit list of major equipment and products proposed for use, with name of manufacturer, trade name, and model number of each product.

2. For equipment and products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

D. Maintenance and Instruction Manuals

1. Ten (10) days prior to scheduled date of completion and readiness for final payment, Contractor shall provide Engineer three (3) copies of maintenance and operation instructions relating to all manufactured items of equipment and materials requiring maintenance.

2. The manuals shall be contained in hard back binders properly identified on front cover with project name, subcontractor, and general content. The material shall be suitable tab-indexed for ready reference, include a Table of Contents, and contain, as available from the Manufacturer/Supplier, the following information:

a. Name of equipment, item, and function.

b. Manufacturer name and address.

c. Model No. and Serial No., with operational equipment identification.

d. Rating in KW, HP, GPM, etc.

e. Description of features in model provided.

f. Drawings of part(s) or assembly(ies) - control diagrams, parts, lists, etc.

g. Connection diagrams, mounting details, installation instruction, etc.

h. Operation and maintenance information for services by Owner.

i. Name, address, and telephone number of supplier and service department.

E. As-Built Information (Project Record Documents)

1. Contractor shall furnish draft as-built information on the Contract Drawings (the Record Drawing set) to the Engineer for approval before submitting for Certificate of Substantial Completion. Submittal of final, approved, as-built information and the Record Drawing Set shall be made prior to submittal of

request for final payment.

2. Describe and dimension, on the Record Drawing Set, vertical and horizontal locations of all buried work that has been done as part of this Contract.

3. Show on the Record Drawing Set, the locations of concealed items that may require maintenance.

4. Show on the Record Drawing Set, all deviations from the Contract Drawings.

5. As-built Drawings shall be prepared from Contractor's Record Documents as described in Section 01720, and shall show all field changes made during the Work.

F. Post-Award Submittals

1. Within fifteen (15) days of Notice of Award, but before starting work, Contractor shall submit performance bond, payment bond, and executed agreement.

2. Within fifteen (15) calendar days of Notice of Award, but before starting work, Contractor shall submit all "or equal" requests, Quality Control Plan, Contractor's Health and Safety Plan, Site Security Plan, and Traffic Control Plan.

3. Certificates of Insurance are due before starting Work (before issuing the Notice to Proceed).

1.5 APPLICABLE STANDARDS

(Not Used)

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION 01 33 00

SECTION 01 35 29

HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES

PART 1 - GENERAL

1.1 SCOPE

This Section describes the Contractor's responsibilities and requirements for assuring the Health and Safety of its employees, support personnel, Subcontractor's employees, vendors and suppliers.

1.2 DESCRIPTION

A. There is potential to encounter VOC-affected soils and groundwater during the performance of the Work. Work performed below the ground surface, work related to handling and transporting of soils and groundwater, and field management of such work shall only be performed by personnel qualified to perform work in hazardous areas in accordance with 29 CFR 1910.120.

B. The requirements contained herein supplement, and do not supersede any federal, state, and local requirements. If a conflict arises between requirements of these Technical Specifications and current requirements and regulations, the more stringent shall apply.

1.3 SUBMITTALS

A. A Site-specific Health and Safety Plan shall be submitted to the Engineer for review within fifteen (15) days of Notice of Award, but before starting work. The Engineer will review this plan for completeness and conformance with applicable laws and regulations. Acceptance and review by Engineer will not constitute approval or warranty regarding the plan's completeness. However, Engineer may provide comments on the plan, based on Engineer's understanding of applicable laws, regulations and the nature of the hazards at the Site.

B. Certification of proper Health and Safety Training, and Medical and Safety Requirements for contractor site personnel included in activities as specified in Section 1.2A above shall be submitted to Engineer as part of the Contractor Health and Safety Plan. Additional copies shall also be maintained on Site.

C. Prior to Mobilization, Contractor shall submit to Engineer a written list of hazardous chemicals that the Contractor will be bringing to the Site, and provide Material Safety Data Sheets (MSDSs) for each hazardous chemical listed.

D. Within fifteen (15) days of Notice of Award, but before starting work, the Contractor shall provide in writing a statement confirming the following:

1. Appropriate Contractor Site personnel will be participating in an appropriate medical surveillance program as specified by 29 CFR 1910.120(f);

2. Appropriate Contractor Site personnel will be current and appropriately trained according the 29 CFR 1910.120(e);

3. The Contractor is capable of and shall supply all required personal protective equipment for their personnel and subcontractors;

4. If respiratory protection is required, all affected Contractor personnel will have received appropriate respirometry testing and fit testing prior to respirator use as required by 29 CFR 1910.134(b)(10), and 29 CFR 1910.120(f);

5. The Contractor shall indemnify Engineer against all third party claims arising from the Contractor's employees, subcontractors employees, visitors, support personnel, vendors, and suppliers as a result of the Contractor's performance under the Contract, including implementation of Health and Safety Program, the Health and Safety Plan, or any Site activities.

E. The effectiveness of the Contractor's Health and Safety Officer in implementing the Contractor's safety program shall be the sole responsibility of the Contractor. At least once each week, the Safety Officer shall review the work and conditions at the Site and prepare and submit in writing to the Engineer, a detailed safety inspection report that shall include a list of noted deficiencies as well as follow-up actions for all job site activities, and date deficiencies were corrected.

1.4 APPLICABLE STANDARDS

The following regulations shall be adhered to during the Work:

1. Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in Title 29 CFR, Parts 1910 and 1926, including current amendments.

2. USEPA Standard Operating Safety Guidelines, Office of Emergency and Remedial Response, Hazardous Response Support Division, Edison, New Jersey.

3. NIOSH/OSHA/USCG/EPA Occupational Safety and Health Guidance Manual for Hazardous Site Activities, October, 1985, DHHS (NIOSH) Publ. No. 85-115.

1.5 CONTRACTOR'S RESPONSIBILITIES

A. The Contractor shall be solely responsible for the health, safety and protection of all its employees, visitors, support personnel, subcontractor's employees, vendors and suppliers who may enter the Site. The Contractor is required to ensure that all above-noted personnel comply with the health and safety provisions outlined in this specification, and the minimum standards set forth under the Occupational Safety and Health Act (OSHA) and other recognized health and safety standards. Any specific operation, machine, or process not addressed in the specification will be governed by other applicable General Safety Orders of OSHA, Winnebago County, and the City of Rockford . These requirements apply continuously throughout the performance of this Contract by Contractor, until final completion of the Work, and is

not limited to regular working hours.

B. Owner and Engineer or their agents, employees or representatives are not responsible for the means, methods, techniques, sequences or procedures utilized by the Contractor, or for safety precautions and programs in connection with the Work. Owner and Engineer have no obligation or responsibility under this Contract to review, approve, inspect or enforce any safety precautions and programs of Contractor.

1.6 SITE HEALTH AND SAFETY OFFICER

Contractor shall designate a Health and Safety Officer to implement, monitor and enforce the Site Health and Safety Plan. The Health and Safety Officer shall identify any unsafe hazards and shall take immediate action to protect site personnel and the environment.

1.7 HEALTH AND SAFETY PROGRAM

A. The Contractor shall maintain a Health and Safety Program consistent with the requirements of the above-noted laws and regulations. At a minimum, the Health and Safety Program shall incorporate the following requirements:

1. Applicable hazardous waste worker training.

2. Medical monitoring and surveillance program.

3. Written health and safety program and site specific health and safety plans.

4. Written respiratory protection and training program.

5. Written hazard communication program.

1.8 SITE SPECIFIC HEALTH AND SAFETY PLAN

A. Contractor shall prepare a Site-specific Health and Safety Plan for use by its employees, visitors, support personnel, subcontractor's employees, vendors and suppliers who may enter the Site. The Health and Safety Plan shall, at a minimum, meet the requirements established in 29 CFR 1910.120(b)(4) and address the following:

1. Description of work to be completed.

2. Site access and controls, including sign-in procedures.

3. Designation of responsible site personnel to contact in the event of emergency - 24 hours per day.

4. Locations and phone numbers of emergency services.

5. Identification of possible chemical exposure hazards.

6. Identification of possible explosion hazards.

7. Health and safety monitoring equipment and procedures for use on site.

8. Site operating procedures and safety guidelines.

9. Emergency procedures and information for personnel injury, fire or equipment failure.

10. Personnel and heavy equipment decontamination procedures prior to leaving the work zones or the Site.

1.9 HEALTH AND SAFETY SITE ACCESS REQUIREMENTS

A. Contractor shall restrict access work areas to those employees, support personnel, subcontractor's employees, vendors, and suppliers necessary for completion of the Work.

B. Contractor shall grant access to any federal, state or local regulatory representative. Proper site entry procedures shall be followed, including review of identification, and Health and Safety training certification, and sign in. Engineer shall be immediately notified of the presence of such representatives.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

B. Contractor shall ensure that the Site is free of all non-prescription drugs, alcohol and firearms at all times.

C. Contractor's superintendent shall take an active role in enforcing the safety requirements by participation in safety conferences, hazard analysis (see below), tool box meetings, walk-through inspections, correction of violations, etc., including that of subcontractor's work.

D. Contractor shall at all times keep the construction area, including storage areas used by him, free from accumulations of waste material and rubbish, and prior to completion of the work remove all waste material and rubbish from the premises and all tools, scaffolding, equipment, and materials not the property of the Owner or Engineer. On completion of the construction, the Contractor shall leave the Site and premises in a clean, neat and workmanlike condition satisfactory to the Engineer, as a condition for final payment.

E. Cutting or welding shall be permitted only in areas that are or have been made fire safe. Where possible, all combustibles shall be located a minimum of 35 feet horizontally from the work site. Where such location is impracticable, all combustibles shall be protected with flame-proof covers or otherwise shielded with metal or asbestos guards or curtains. Edges of covers at the floor shall be tight to

prevent sparks from going under them. This precaution is also important at overlaps where several covers are used to protect a large pile. Other fire prevention precautions shall be in accordance with the latest National Fire Codes.

F. Contractor shall maintain roads subject to interference by the Work, open at all times, or provide and maintain suitable detours in accordance with the City of Rockford regulations and the Project Traffic Control Plan. Provide, maintain and erect necessary barricades, suitable and sufficient flasher lights, flagmen, danger signals and signs and take all necessary precautions for the protection of the Work and the safety of the public.

G. Protect roads closed to traffic by effective barricades on which acceptable warning and detour signs are placed. Illuminate all barricades and obstructions from sunset until sunrise.

H. If the Engineer notifies the Contractor in writing that a condition exists that violates the safety and health requirements of these specifications or of standards referenced in this section, the Contractor shall immediately correct the condition. In the event that the Contractor fails or refuses to promptly correct the condition, the Engineer may issue a stop work order to all or any part of the Work. When satisfactory corrective action has been taken, an order to resume Work shall be issued. The Contractor shall not be entitled to any extension of time, nor to any claim for damage, or to additional compensation by reason of either the directive or the stop work order. The Owner and Engineer shall not be liable for failure to order the discontinuance of any or all of the Contractor's operations nor shall any such failure relieve the Contractor of his responsibility for the safety of personnel and property.

I. All cases of first aid, death, occupational diseases, or traumatic injury of employees or the public, or property damage resulting from performance of Work under this Contract shall be recorded and reported to the Engineer immediately and followed up in writing within 24 hours.

J. Operation of equipment, including equipment on slopes shall be in a manner approved by the equipment manufacturer in all operating configurations.

K. If a conflict should occur between the requirements contained in the Technical Specifications, Contractor's approved health and safety program, or the referenced safety and health code and standards, the more stringent requirement shall prevail.

END OF SECTION 01 35 29

SECTION 01 35 43

ENVIRONMENTAL PROCEDURES

PART 1 - GENERAL

1.1 SCOPE

This section describes the responsibility for quality control and testing for environmental protection by the Contractor, the quality assurance function of the Engineer, and the use of certificates of compliance.

1.2 DESCRIPTION

For the purpose of the Work, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic and recreational purposes. The control of environmental pollution requires consideration of air, water, and land, and involves noise, solid waste-management, and management of radiant energy and radioactive materials, as well as other pollutants.

1.3 SUBMITTALS

(Not Used)

1.4 APPLICABLE REGULATIONS

A. In order to prevent, and to provide for abatement and control of, any environmental pollution arising from the construction activities of the Contractor and his subcontractors in the performance of this contract, they shall comply with all applicable Federal, State, and local laws, and regulations concerning environmental pollution control and abatement.

B. All construction activities performed for this project is subject to federal environmental laws including, but not limited to: The National Environmental Policy Act (NEPA); The National Historic Preservation Act; Endangered Species Act; Resource Conservation and Recovery Act (RCRA); Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); Clean Water Act; Clean Air Act; Safe Drinking Water Act; and applicable state, regional, and local equivalents. The Contractor shall be responsible for compliance with all applicable laws, regulations, and requirements.

2.5 CONTRACTOR REQUIREMENTS

A. The Engineer will notify the Contractor in writing of any non-compliance with the foregoing provisions and the action to be taken. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the Site, shall be deemed sufficient for

the purpose. If the Contractor fails or refuses to comply promptly, the Engineer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor.

B. Compliance with the provisions of this section by subcontractors will be the responsibility of the Contractor.

C. It is intended that the land resources within the project boundaries and outside the limits of permanent work performed under this contract be preserved in their present condition or be restored to a condition after completion of construction that will appear to be natural and not detract from the appearance of the Site. Insofar as possible, the Contractor shall confine his construction activities to areas defined by the Contract Drawings or Technical Specifications.

D. There is a low probability that archaeological remains exist at the Site. Should any skeletons, artifacts, or other archaeological remains be uncovered, the Contractor shall suspend operations at the site of discovery and continue operations in other areas. The Contractor shall notify the Engineer immediately of the findings. Included with the notification shall be a brief statement of the location and the findings. Should the discovery require archaeological studies resulting in delays and/or additional work, the Contractor will be compensated by an adjustment under the terms of the Contract.

E. Open burning of rubbish, debris, and other combustibles will not be permitted.

F. The Contractor is required to maintain all excavations, embankments, stockpiles, haul roads, permanent access roads, plant sites, waste areas, borrow areas, and all other work areas within or without the project boundaries free from dust which would cause the local standards for air pollution to be exceeded or which would cause a hazard or nuisance to others.

G. The Contractor shall maintain all noise levels within the following limits and regulations:

1. All vehicles shall have operational noise suppression systems (e.g. mufflers).

2. Noise levels shall comply with OSHA Standards for the State Model Community Noise Control Ordinance.

H. The Contractor shall see that all his vehicles and stationary piston-engine-powered equipment have emission control systems in conformance with Federal, State, and local regulations, as specified in 40 CFR 60 and 40 CFR 85-86 (and later amendments); and in State and local rules and regulations. The emission control systems shall be operational and well maintained at all times.

I. During the construction period the Contractor shall conduct adequate training courses for his supervisory maintenance personnel. The curriculum shall include but not be limited to the following topics:

1. Methods of detection and avoiding pollution;

2. Familiarity with environmental standards, both statutory and contractual;

3. Instruction in the recognition of archaeological resources.

END OF SECTION 01 35 43

SECTION 01 43 00

QUALITY ASSURANCE

PART 1 - GENERAL

1.1 SCOPE

This section describes the Quality Assurance function of the Engineer. This section does not list specific quality assurance tasks. Specific quality control and assurance tasks are provided in the Construction Quality Assurance Project Plan which is part of the Remedial Design for the SER Site.

1.2 DESCRIPTION

A. Quality Assurance (QA) refers to the Engineer's testing of materials and construction inspection deemed necessary by the Engineer for determining compliance of such materials and construction with the requirements of the Contract Documents.

B. The Engineer will maintain a construction inspection staff and testing laboratory independent of the Contractor's QC operation.

C. If recurring deficiencies in an item or items indicate that the Contractor's QC system is not adequate, such corrective actions will be taken as required by the Engineer.

D. QA testing by the Engineer and the Engineer's testing laboratory shall not relieve the Contractor of performing all QC testing as necessary to determine compliance of the work and materials to the requirements of the Contract Documents.

E. All QA inspection and testing by the Engineer will be performed in such manner as not to unnecessarily delay the work. The Engineer reserves the right to reinspect and retest when material or workmanship is not ready at the time scheduled by the Contractor for inspection and to retest and reinspect work previously rejected. The Engineer reserves the right to charge the Contractor for any additional cost for such reinspection or retest.

F. Nothing herein shall be construed as relieving Contractor of any responsibility or obligation under the Contract Documents.

G. The Engineer will inspect and provide final approval of all aspects of the Work.

1.4 APPLICABLE STANDARDS

(Not Used)

PART 2 - PRODUCTS

(Not Used)

PART 3 -EXECUTION

(Not Used)

END OF SECTION 01 43 00

SECTION 01 45 00

QUALITY CONTROL

PART 1 - GENERAL

1.1 SCOPE

This section describes the responsibility for Quality Control and testing by the Contractor and the use of certificates of compliance. This section does not list specific quality control tasks. Specific quality control tasks are provided in the Construction Quality Assurance Project Plan which is part of the Remedial Design for the SER Site.

1.2 DESCRIPTION

A. Quality control (QC) refers to the sampling, testing and measuring of all materials used at the Site and the verification checking of the Technical Specifications and Contract Drawings by the Contractor to ensure that the Work conforms to the requirements of the Drawings and Specifications, including compliance with all pertinent codes, regulations and standards referenced within the Contract Documents.

B. The Contractor shall establish a quality control system to perform sufficient inspection and tests of all items or work, including that of subcontractors, to ensure conformance to the Contract Documents with respect to the materials, workmanship, construction, finish, functional performance, and identification. This control shall be the responsibility of the Contractor for all construction, except where the Technical Specifications provide for specific inspections, tests, or other means to be performed by the Engineer.

C. The Contractor's quality control system is the means by which he assures himself that his construction complies with the requirements of the Contract Documents. The controls will be adequate to cover all of the requirements of the Contract Documents. The controls will be adequate to cover all construction operations and should be keyed to the proposed construction sequence.

D. The Contractor's job supervisory staff may be used for quality control, supplemented as necessary by additional personnel for surveillance, special technicians, or testing facilities to provide capability for the controls required.

E. After the contract is awarded and before construction operations are started, the Contractor shall meet with the Engineer, and/or his representative, and discuss QA requirements as outlined in the Construction Quality Assurance Project Plan. The meeting will develop mutual understanding relative to details of the system, including the forms to be used for recording the QC operations, inspections, administration of the system, and the interrelationship of Contractor and the Engineers inspections.

1.3 SUBMITTALS

A. Submit to the Engineer for review within fifteen (15) calendar days after the receipt of the Notice to Award, but before beginning work, a Quality Control Plan which shall include the procedures and reports the Contractor intends to use. This document shall include as a minimum:

1. The QC organization.

2. Number and qualifications of personnel to be used.

3. Authority and responsibilities of QC personnel.

4. Methods of QC including that for subcontractor's work.

5. Method of documenting procedures of the Contractor's QC operation and testing.

6. Identification of independent testing agencies or subcontractors the Contractor proposes for use in the Work to perform test and inspection services.

B. The Contractor may use certificates of compliance for certain materials and products in lieu of specified sampling and testing procedures. The Contractor shall submit certificates required for demonstrating proof of compliance of materials with specification requirements with each lot of such material delivered to the Site. The lot so certified shall be clearly identified by the certificate. Certificates shall be signed by an authorized representative of the producer or manufacturer and shall state that the material complies in all respects with the requirements of the Contract Documents.

C. The certificate of compliance shall be accompanied by a certified copy of test results or shall state that such test results are on file with the producer or manufacturer and shall be furnished to the Engineer on request. The certificate shall include the name and address of the organization performing the test, the date of the test, and the quality of certified material shipped.

D. Materials used on the basis of a certificate of compliance may be sampled and tested by the Engineer at any time. The fact that the material is used on the basis of a certificate of compliance shall not relieve the Contractor of responsibility for incorporating material in the Work which conforms to the requirements of the Contract Documents. Any such material not conforming to such requirements will be subject to rejection, whether in place or not.

E. The Engineer reserves the right to refuse the use of certain materials on the basis of a certificate of compliance.

1.4 APPLICABLE STANDARDS

(Not Used)

1.5 PROJECT INSPECTION

The Engineer will inspect and provide final approval of all aspects of the Work.

1.6 LABORATORY EQUIPMENT

The Contractor shall supply all facilities, sampling and testing equipment required for the QC program for the tests required of the Contractor as specified in the Construction Quality Assurance Project Plan.

PART 2 - PRODUCTS

(Not Used)

PART 3 -EXECUTION

(Not Used)

END OF SECTION 01 45 00

SECTION 01 56 00

TEMPORARY BARRIERS AND ENCLOSURES

PART 1 - GENERAL

1.1 SCOPE

A. Contractor shall be responsible for the protection of persons and property.

B. Contractor shall be responsible for the protection and prevention of site access.

C. Contractor shall be responsible for traffic maintenance.

D. Contractor shall be responsible for noise control.

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTALS

A. No later than fifteen (15) calendar days after receipt of Notice of Award, but before beginning work, Contractor shall submit to the Engineer for approval a plan outlining Contractor's site security program. The plan shall be prepared and executed in accordance with the requirements in this section, and other relevant sections of this Specification. Contractor's Site Security Plan may be incorporated into Contractor's Health and Safety Plan.

B. Contractor's Site security plan shall be in compliance with all applicable OSHA, EPA, Section 01 35 29 of these Specifications, and Contractor's Health and Safety Plan.

C. Contractor shall designate in the Plan a site security officer. This may also be the Site Health and Safety Officer, as required per Section 01 35 29 of the Specifications.

1.4 APPLICABLE STANDARDS

A. Occupational Safety and Health Administration (OSHA) Standards and Regulations.

B. NIOSH/OSHA/USCG/EPA Occupational Safety and Health Guidance Manual for Hazardous Site Activities, October, 1985, DHHS (NIOSH) Publ. No. 85-115.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

A. Where the Work is conducted in or adjacent to any street, alley, or public place, the Contractor shall provide Detours and Traffic Control, furnish and erect such barricades, fences, lights, and danger signals and shall furnish such personnel to

warn the public and guard the site and shall take such other precautionary measures as are reasonable necessary to protect persons, property, and the Work done under the Contract and obtain any necessary permits from the City of Rockford.

B. Excavations in or adjacent to public streets or alleys shall be securely barricaded so as to prevent access by small children or any other person or vehicle when Work is not being carried on at the site of excavation. Such barricades shall be painted in a color that is visible at night.

C. The Contractor shall follow the guidelines set forth in the Work Area Traffic Control and Safety Handbook and Manual on Uniform Traffic Control Devices (MUTCD) or other guidelines or regulations required by applicable law and any permit conditions.

D. Contractor shall maintain the flow of pedestrian and vehicle traffic around and adjacent to all of the work conducted by the contractor. Interruptions to traffic should be minimized to the extent possible.

E. Contractor shall supply and maintain traffic barricades around all work areas.

F. An open fire lane is to be maintained at all times in accordance with local and state codes.

G. Contractors shall provide traffic flaggers as required by local and state codes.

H. The Contractor shall comply with all applicable noise control regulations observed by the City of Rockford and/or promulgated by OSHA. If the Contractor believes that the Work will violate these provisions, the Contractor shall notify the Engineer and shall also apply for a variance from the Owner before beginning the Work. The Owner may apply to the appropriate governing authorities for a variance to these standards if the Owner finds that compliance will cause an undue hardship and further finds that:

1. The activity, operation or sound source will be of temporary duration, and even with the application of the best available control technology cannot be done in a manner that would comply; or

2. No reasonable alternative is available to the applicant.

3. If the governing authorities grant a variance, the Owner will prescribe such reasonable conditions or requirements as are necessary to minimize adverse effects upon the community or the surrounding neighborhood.

END OF SECTION 01 56 00

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SCOPE

This section describes the requirements for handling and protection of materials and products to be incorporated in the construction.

1.2 MANUFACTURER'S RECOMMENDATIONS

Except as otherwise approved in writing by Engineer, determine and comply with manufacturer's recommendations on materials and product handling, storage, and protection.

1.3 PACKAGING

A. Deliver materials and products to the Site in the manufacturer's original container.

B. Maintain packaged materials with seals unbroken and labels intact until time of use.

C. Contractor shall promptly remove any damaged material and unsuitable items from the Site and replace the same with material that conforms with specified requirements, at no additional cost above the Contract Price.

D. Engineer may reject as non-complying such material and products that do not bear satisfactory identification of manufacturer, grade, quality, and other pertinent information.

1.4 PROTECTION

A. Contractor shall protect from damage, finished surfaces through which equipment and materials are handled.

B. Contractor shall maintain finished surfaces in a clean, unmarred, and suitably protected condition until accepted by the Engineer.

1.5 REPAIRS AND REPLACEMENTS

A. In event of damage, the Contractor will make Engineer-approved replacements and repairs at no additional cost above the Contract Price.

B. Unless otherwise provided in writing, additional time required to secure replacements and make repairs shall not justify an extension in the Contract Time of Completion or additional compensation above the Contract Price.

PART 2 - PRODUCTS

(Not used)

PART 3 - EXECUTION

(Not used)

END OF SECTION 01 60 00

SECTION 01 74 00

CLEANING AND WASTE MANAGEMENT

PART 1 - GENERAL

1.1 SCOPE

This section describes the requirements for cleaning and waste management at the construction site.

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTALS

All documentation submitted in regards to Cleaning and Waste Management shall be in accordance with Contract Documents and Section 01 33 00.

PART 2 - PRODUCTS

(Not Used)

PART 3 – EXECUTION

A. The Contractor shall routinely keep the Work site and the surrounding premises free of accumulated waste materials. Waste materials must be removed regularly to a suitable landfill or recycling facility.

B. If space is available, the Engineer may designate a place on the site to collect all debris, rejected materials, and other waste materials. If such a place is designated, the Contractor shall, at the Contractor's sole expense, install fencing and whatever else is necessary to keep loose materials confined so that they are not scattered.

C. The Contractor shall be liable for any damage caused by construction materials that have been scattered by wind. Progress payments may be withheld if the Contractor fails to maintain the Work site in a clean, orderly, and safe condition

D. When reasonable and appropriate, equipment, tools, and materials must be kept out of streets. Equipment that may endanger vehicular traffic must be lighted and marked to warn motorists. No sand, gravel, rocks, mud, dirt, or other debris may be deposited upon any street. If the Contractor does not comply with this provision, the Owner may have the debris removed and the costs of removal may be deducted from any payment to the Contractor or charged to the Contractor directly.

E. At the completion of the Work, the Contractor shall remove all spots from floors, walls, ceilings, windows, and doors and, where necessary, refit windows, doors, and cabinet work. The Contractor shall also clean all window glass and all plumbing fixtures.

F. At the completion of the Work, the Contractor shall make such minor repairs and alterations as may be necessary to operate the remedial systems. The Contractor shall replace all broken and scratched glass with material that complies with the Contract Documents.

G. This Section shall not apply after or to the extent that the Owner has taken possession of a building on which the Contractor has performed Work for conditions occurring after Owner has taken possession

H. At the completion of the Work, the Contractor shall have the sidewalks and streets affected by the Work swept clean of sand, gravel, rocks, mud, dirt or other debris by a street or sidewalk cleaner when necessary, as determined by the Engineer. The Owner will not authorize final payment until the Contractor has removed all rubble and other debris from the street and adjoining work area.

END OF SECTION 01 74 00

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SCOPE

This section describes the closeout procedures for the work completed at the SER Site.

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTALS

All documentation submitted in regards to the closure of the project shall be in accordance with Contract Documents and Section 01 33 00.

PART 2 - PRODUCTS

(Not Used)

PART 3 – EXECUTION

A. When the work is complete and ready for final inspection, the Contractor shall file a written notice with the Engineer to that effect at least 7 days in advance of the desired time for final inspection. Owner shall be at this inspection along with Engineer and Contractor.

B. The final inspection shall consist of a walk-through inspection of the project site. Following the final inspection, the Engineer shall send the Contractor a final inspection report, which shall notify the Contractor of any incomplete, unsatisfactory, or questioned Work noted by the Engineer.

C. The Contractor shall satisfy any remaining questions or repair or replace the incomplete or unsatisfactory Work promptly as directed by the Engineer. If the Contractor does not begin to take such action within 5 days after receipt of notice, or does not pursue such action diligently, the Owner may, without further notice and without impairing the Contract, make other arrangements to have the questions answered and the Work completed in a satisfactory manner at the Contractor's expense.

D. The Contractor and its surety shall be liable for any costs so expended by the Owner, and such costs may be deducted from any payments due or that may become due to the Contractor under the Contract.

E. The Contractor shall not become eligible for final payment from the Owner until the Engineer finally accepts the Work by certifying in writing that the Work has been

completed and that the Contractor has passed the final inspection. The Contractor shall be deemed to have finally completed the Work when the Contractor has remedied all deficiencies to the satisfaction of the Engineer and delivered all construction records, as-built plans and specifications, maintenance and operating instructions, schedules, guarantees, certificates of inspection, and other documents required by the Contract and the Owner issues a favorable final inspection report.

END OF SECTION 01 77 00

SECTION 02 51 00

PHYSICAL DECONTAMINATION

PART 1 - GENERAL

1.1 SCOPE

This specification outlines the procedures for the decontamination of equipment used for the excavation of soils in the Outside Container Storage Area (OSA) and for the installation of the soil vapor extraction and air sparge remediation system. Decontamination of the equipment shall be completed in accordance with the References and Standards listed in this specification as will as in accordance with the Applicable or Relevant and Appropriate Regulations (ARARs) listed in the Design Document.

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTALS

A. The Contractor shall make all submittals in accordance with the requirements of Section 01 33 00.

B. Equipment decontamination procedures shall be submitted as part of the Heath and Safety Plan (HASP) and shall detail all equipment (catalog cuts shall be provided) and procedures proposed for decontamination of equipment used in contaminated areas, including:

1. Proposed water supply source and method;

2. Proposed pressure washing equipment and procedures;

3. Proposed decontamination procedures; and

4. Decontamination pad plan.

1.4 APPLICABLE STANDARDS

Pertinent provisions of the publications and standards listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASTM D 5088-90 Standard Practice for Decontamination of Field Equipment Used at Nonradioactive Waste Sites.

SEMI S12-0298 Guidelines for Equipment Decontamination

The work completed under this specification will be conducted in accordance with the ARARs listed in the Design Document.

1.5 CONTRACTOR RESPONSIBILTY

A. The contractor shall be responsible for provision and maintenance of the equipment required for decontamination as specified in Part 2 - Products, and for the maintenance of the decontamination pad, drainage pipes, and collection structure, and all other facilities and equipment included in the equipment decontamination system. The Contractor shall be responsible for the decontamination of all equipment as specified in Part 3.1 (A).

B. The Contractor shall provide an acceptable supply of decontamination water, ensuring that a minimum of 500 gallons of decontamination water is always available at the site.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Portable cleaning equipment shall be provided by the Contractor and be suitable to provide proper decontamination of the equipment. Suitable decomtamination equipment includes steam and/or pressure washers. The steam and/or pressure washer(s) shall be the property and responsibility of the Contractor

B. The Contractor shall provide all hosing and fittings necessary to connect the pressure washer(s) to the water supply source.

C. Decontamination equipment includes traps, plastic sheeting, drums, etc. The Contractor shall be responsible for providing all scrub brushes or other equipment necessary to remove caked or hardened material from the equipment.

D. At all times, Contractor shall maintain in satisfactory working condition all equipment, tools and machines used in completing the Work.

PART 3 - EXECUTION

3.1 GENERAL

A. All equipment within the Exclusion Zone, as defined in the Health and Safety Plan, shall require decontamination to avoid spreading contamination into uncontaminated areas. All Contractor materials, equipment and facilities that have been exposed to contamination and can be certified decontaminated, shall be decontaminated, inspected and approved by the Professional prior to removal from the site. All small tools and other materials for which decontamination is difficult or uncertain shall be packaged and disposed of by the Contractor in accordance with applicable or appropriate and relevant disposal regulations for contaminated materials. Examples of such materials are, but are not limited to, personal protective equipment, rope, lumber, plastic, etc.

B. All equipment requiring decontamination shall be washed to the extent that visible soil dust is removed from the equipment. Any vehicles exiting the Exclusion Zone

shall be washed to the extent that visible soil is removed from the vehicle body and undercarriage and no visible tracking of soil onto state and local highways and roads or Township roads occurs, as determined by the Project Manager or the Professional.

C. The decontamination process shall be performed in such a manner that all water used and soil removed during decontamination falls onto, and is captured by, the decontamination pad. Soil captured on the decontamination pad shall be removed on a daily basis or as required to prevent sediment buildup within the decontamination pad, as determined by the Professional. The water and soil removed from the decontamination pad shall be disposed of in accordance with State and local regulations.

D. The decontamination pad shall be located in the Hamilton Sundstrand paved area north of the OSA.

E. The decontamination pad shall be made with impermeable polyethylene sheeting placed on the asphalt and sloped for water collection.

F. Construction shall be sequenced to avoid spreading of contamination into uncontaminated areas. Equipment shall be decontaminated to avoid spreading contamination onto previously uncontaminated equipment. Small equipment shall be rinsed with potable water. Professional shall approve alternative decontamination procedures and methods prior to their use. Perform decontamination at a specially designated decontamination area as authorized by the Professional.

END OF SECTION 02 51 00

SECTION 02 81 00

TRANSPORTATION AND DISPOSAL OF CONTAMINATED SOILS

PART I - GENERAL

1.1 SCOPE

This specification covers the requirements and procedures for the removal and disposal of contaminated soils

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Contractor shall submit all original (or copies of originals if necessary) documentation pertaining to the transport and disposal of the excavated soils in accordance with the Codes and Standards listed in Part 1.4 of this specification

1.4 APPLICABLE STANDARDS

A. Code of Federal Regulations (CFR):

1. 29 CFR Part 1926 Occupational Safety and Health Standards – Excavation
2. 26 CFR Part 1910 Worker Exposure Limits- Toxic and Hazardous Substances, Noise, and Emergency Response
3. 40 CFR Part 241 Guideline for the Land Disposal of Solid Waste
4. 40 CFR Part 261 Identification and Listing of Hazardous Waste
5. 40 CFR Part 262 Standards for Hazardous Waste Generators
6. 40 CFR Part 263 Standards for Hazardous Waste Transporters
7. 40 CFR Part 264 Standards for Owners and Operators of Hazardous Waste Treatment Storage and Disposal Facilities
8. 40 CFR Part 265 Interim Status Standards for Owners and Operators of Hazardous Waste Treatment Storage and Disposal Facilities

9. 40 CFR Part 268 Land Disposal Restrictions- RCRA

10. 40 CFR Part 280 Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks

11. 49 CFR Parts 107, 171.1-171.5 Department of Transportation rules for Transportation of Hazardous Materials

B. Illinois Environmental Protection Agency (IEPA)

Section 21 (415 ILCS5/21) Pollution control Board (Title 35)

C. OSWER Directive 9355

1.5 CONTRACTOR RESPONSIBILTY

Contractor will coordinate the transportation and disposal of all excavated materials derived from the excavation of soils in the Outside Container Storage Area (OSA) and for the installation of the soil vapor extraction and air sparge remediation system.

1.6 QUALIFICATIONS

Contractor and all Subcontractors will have appropriate training for the handling, transportation, and disposal of hazardous waste and conform to the Codes and Standards listed in Part 1.4 of this specification.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

3.1 GENERAL

A. Excavation work will be in accordance with specifications under Section 31 23 00.

B. Excavated soil will be loaded into lined roll off boxes or into trucks with lined boxes.

C. Roll off boxes and/or truck boxes will be covered with tarps prior to transport to the designated waste facility.

D. Waste characterization will be performed in accordance with the Codes and Standards listed in Part 1.4 of this specification prior to the transportation of soils offsite.

E. Proper manifests and Land Disposal Restriction (LDRs) forms will be generated and signed in accordance with the Codes and Standards listed in Part 1.4 of this specification prior to the transportation of the soils offsite.

F. Trucks will be properly placarded in accordance with the Codes and Standards listed in Part 1.4 of this specification prior to the transportation of the soils offsite.

END OF SECTION 02 81 00

SECTION 03 11 00

CONCRETE FORMING

PART 1 - GENERAL

1.1 SCOPE

A. This section describes the requirements for furnishing and installing formwork for cast-in place concrete, with shoring, bracing and anchorage. This section also describes the form accessories required for this Work, and form stripping once the Work is completed.

B. The work of this Section shall be in conformance with the requirements of American Concrete Institute (ACI) 347, except as modified herein.

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTALS

Product Data: The Contractor shall provide data on form materials and the installation requirements of the formwork.

1.4 APPLICABLE STANDARDS

Pertinent provisions of the following referenced standards shall apply to the work of this section, except as may be modified herein, and form a part of this section to the extent referenced. The publications are referred to in the text by their basic designation only:

ACI 301 Structural Concrete for Buildings

ACI 318 Building Code Requirements for Reinforced Concrete

ACI 347 Recommended Practice For Concrete Formwork

1.5 CONTRACTOR RESPONSIBILITY

The Contractor shall design, engineer and construct formwork, shoring and bracing to conform to design and code requirements; resultant concrete shall conform to the required shapes, lines and dimensions shown on the Contract Drawings.

1.6 QUALIFICATIONS

(Not Used)

PART 2 - PRODUCTS

2.1 GENERAL

Except for metal forms, use new materials. Materials may be reused during progress of the Work provided they are completely cleaned and reconditioned, recoated for each use, and capable of producing formwork of the required quality.

2.2 FORMS FOR FOOTINGS AND FOUNDATIONS

Use two-inch nominal Douglas for boards or planks secured to wood or steel stakes, constructed to shapes indicated on Contract Drawings. Side forms for footings may be omitted and concrete may be placed directly against solid excavation walls only when requested by the Contractor and approved by the Engineer. When omission of forms is accepted, provide additional concrete one-inch on each side of the minimum design profiles and dimensions shown on the drawings.

2.3 FORMWORK ACCESSORIES

A. Form Ties: Factory fabricated, adjustable length, removable or snap-off stainless steel form ties, designed to prevent form deflection, and to prevent spalling of the concrete surfaces upon removal. Unless otherwise indicated, provide ties so the portion remaining within concrete after removal is at least 1-1/2 inches inside concrete. Unless otherwise shown, provide form ties which will not leave holes larger than one inch diameter in concrete surface, as manufactured by Burke, or Engineer approved equal.

B. Form Release Agent: Colorless chemical free of oil or lacquer, which will not stain concrete, absorb moisture, or impair natural bonding or characteristics of coatings intended for use on concrete. "Magic Kote" manufactured by Symons Corp. or Engineer-approved equal.

C. Corners: Chamfered, rigid plastic or wood strip; ¾ x ¾ inch; maximum possible lengths.

D. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

PART 3 - EXECUTION

3.1 QUALITY CONTROL

A. The Contractor shall perform Work in accordance with ACI 347, 301, 318.

B. Formwork Tolerances: All formwork shall be constructed to maintain the tolerances required by ACI 301.

C. The Contractor shall verify all lines, levels and centers before proceeding with formwork, so as to ensure that the dimensions are in compliance with those indicated in the Contract Drawings.

D. Field Quality Control:

1. The Contractor shall inspect the erected formwork, shoring, and bracing to ensure that work is in accordance with Contract Documents, and that supports, fastenings, wedges, ties, and items are secure. If the Engineer feels that the work does not conform to the stated standards, the Contractor shall dismantle and reassemble the formwork to the satisfaction of the Engineer.

2. The Contractor shall not reuse wood formwork more than 2 times for concrete surfaces that are to be exposed to view. The Contractor shall not patch, but replace, any damaged formwork with good form.

3.2 ERECTION - FORMWORK

A. The Contractor shall erect all formwork, shoring and bracing to achieve the design requirements, in accordance with requirements of ACI 301. Bracing shall be provided to ensure the stability of the formwork. The Contractor shall shore or strengthen formwork that is subject to over stressing by construction loads.

B. Formwork shall be arranged and assembled in a way that permits dismantling and stripping after the conclusion of the Work. The Contractor shall take precautions not to damage concrete during stripping.

C. All form joints shall be aligned and made watertight.

D. The Contractor shall obtain approval of the Engineer before framing any openings in structural members which are not indicated on the Contract Drawings.

E. Fillet and chamfer strips shall be provided by the Contractor on external corners of beams, joists, and columns.

F. The Contractor shall install void forms in accordance with manufacturer's recommendations. Forms shall also be protected from moisture or crushing.

3.3 APPLICATION - FORM RELEASE AGENT

A. The Contractor shall apply form release agent on formwork in accordance with manufacturer's recommendations, prior to placement of reinforcing steel, anchoring devices, and embedded items.

B. The Contractor shall not apply form release agent where concrete surfaces shall receive special finishes or applied coverings.. All inside surfaces of untreated forms shall be soaked with clean water and coated prior to placement of concrete.

3.4 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. The Contractor shall provide formed openings where required for items that are to be embedded in passing through concrete work. All other items, that are directly cast into concrete, shall be located and set in place prior to pouring concrete.

B. The Contractor shall coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of the Work.

C. The Contractor shall install accessories straight, level, and plumb and in accordance with the manufacturer's instructions, such that items are not disturbed during concrete placement.

D. The Contractor shall provide temporary ports or openings in formwork, as necessary, to facilitate cleaning and inspection operations, and also locate openings at the bottom of forms to allow drainage.

E. All temporary openings shall be closed with tight fitting panels that are flush with the inside face of forms, and neatly fitted so that joints shall not be apparent in exposed concrete surfaces.

3.5 FORM CLEANING

A. As erection proceeds, forms and form cavities shall be cleaned and all foreign matter removed. Prior to placing of concrete, the Contractor shall flush with water or use compressed air to remove any remaining foreign matter on the forms.

B. During cold weather, the Contractor shall remove ice and snow from within forms. De-icing salts and water shall not be used to clean out forms, unless formwork and concrete construction proceed within a heated enclosure. The Contractor shall use only compressed air or other means to remove foreign matter.

3.6 FORM REMOVAL

A. The Contractor shall not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and the imposed loads for which it has been designed. The Contractor shall be liable for damage and injury to concrete caused by removing forms before the concrete has gained strength.

B. The forms shall be loosened carefully. The Contractor shall not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

C. The Contractor shall store the removed forms in a manner that does not damage the surfaces in contact with fresh concrete. All damaged forms shall be discarded.

END OF SECTION 03 11 00

SECTION 03 20 00

CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SCOPE

This section describes the requirements for furnishing, detailing, fabricating and installing reinforcing steel bars, welded wire fabric and accessories for cast-in-place concrete construction.

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTALS

1. The Contractor shall make all submittals under the provisions of Section 01 33 00

2. Fully detailed Shop Drawings, including bending schedules and bending diagrams, shall be submitted to the Engineer for review. Shop drawings shall show fabricating and placing details and size and location of all reinforcing steel. Shop Drawings shall be prepared in accordance with the applicable requirements and guidelines of ACI 315.

C. Shop Drawings shall be of such detail and completeness that all fabrication and placement at the Site can be accomplished. Shop Drawings shall include number of pieces, sizes, and markings of reinforcing steel, laps and splices, supporting devices and accessories, and any other information required for fabrication and placement.

D. Contract Drawings for anchor bolt schedules and locations, anchors, hangers, inserts, conduits, sleeves, and any other items to be cast in concrete shall be checked for possible interference with reinforcing steel. Required clearances shall be indicated on Shop Drawings.

E. Reinforcement Shop Drawings shall be submitted at least 7 days before scheduled delivery of reinforcement.

F. Reinforcement detail drawings shall be corrected by the Contractor to show "as-built" conditions upon completion of the steel layout.

G. Certified copies of mill tests on each heat or melt of steel stating the grade and physical and chemical properties of the reinforcing steel, and conformance with ASTM specifications, shall be available to the Engineer at the time of inspection or delivery.

1.4 APPLICABLE STANDARDS

A. The Publications listed below form a part of this Specification to the extent referenced. The Publications are referred to in the text by the basic designation only:

1. American Concrete Institute (ACI):

ACI 301	Structural Concrete for Buildings
ACI 315	Manual of Standard Practice for Detailing Reinforced Concrete Structures
ACI 318	Building Code Requirements For Reinforced Concrete
ACI SP-66	American Concrete Institute - Detailing Manual

2. American Society for Testing and Materials (ASTM):

A185	Welded Steel Wire Fabric for Concrete Reinforcement
A497	Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete
A615	U.S. Bar Sizes

PART 2 - PRODUCTS

2.1 GENERAL

A. Each bundle of steel reinforcement shall be tagged at the mill with a mill tag showing the name of the mill, melt or heat number, and type or grade of steel.

B. Steel reinforcement shall be delivered to the job site, stored, and covered in a manner which will ensure that no damage shall occur to it from moisture, dirt, grease, or any other cause which might impair bond with concrete.

C Steel reinforcement shall be stored off the ground and shall be kept in a clean condition. Bars shall not be bent or straightened in a manner that will injure the material. Bars for the various contract items shall be stockpiled separately and shall not be used interchangeably.

D. A sufficient supply of approved steel reinforcement shall be stored at the Site at all times to ensure that there will be no delay of the Work.

E. Identification of steel reinforcement shall be maintained after bundles are broken.

2.2 REINFORCING BARS

Reinforcing bars shall be deformed bars conforming to ASTM A615, grade 60, including supplementary requirements.

2.3 WELDED WIRE FABRIC

Use electrically welded wire fabric conforming to ASTM A185 for smooth steel wire or ASTM A497 for deformed steel wire; however, for wire with a specified yield strength exceeding 60,000 psi, the yield strength shall be the stress corresponding to a strain of 0.35%.

2.4 ACCESSORIES

Reinforcement accessories, consisting of spacers, chairs, ties, and similar items required for spacing, assembling, and supporting reinforcement in place, shall conform with the applicable requirements of the referenced standards herein specified.

A. For footings or other concrete on grade, use supports with sand or precast concrete bases or plates or horizontal runners where wetted base materials will not support chair legs.

B. For exposed-to-view concrete surfaces, where legs of support are in contact with forms, provide supports with legs which are hot-dip galvanized, plastic protected, or stainless steel protected.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Conformance with the Construction Drawings and shop drawings for size, type, configuration and placement will be inspected and documented.

3.2 GENERAL

3. For reinforcement fabrication and installation, Contractor shall conform to the following criteria when placing reinforcing bars and fabrics unless otherwise noted on Contract Drawings.

    1. Welded wire fabric shipped in rolls shall be straightened into flat sheets before being placed.

    2. Ensure that the reinforcement conforms to the requirements as shown on the Contract Drawings and on approved Shop Drawings.

    3. Place reinforcing bars in lengths up to 60 feet.

    4. Locate splices where required for construction. The location of splices may be altered, subject to written approval by the Engineer. Approved mechanical connections may be used in place of splices and shall conform to the requirements of ACI 318.

5. Bars spliced at additional locations, other than those shown on the Contract Drawings, for the convenience of the Contractor are acceptable subject to written approval by the Engineer. Some bent bars may exceed usual shipping clearances, and the cutting and bending of such bars from stock lengths may be required at the Site.

6. Unless otherwise prescribed, calculate placement dimensions to the centerline of the bars. Reinforcement shall be inspected for compliance with requirement as to size, shape, length, splicing, position, and in-place quantity.

7. Before reinforcement is embedded in concrete, clean the surfaces of the bars, fabric and the surfaces of any supports of flaky rust, loose mill scale, dirt, grease, or other foreign substances that, in the opinion of the Engineer, are objectionable. Heavy flaky rust that can be removed by firm rubbing with burlap, or equivalent treatment, is considered objectionable.

8. Accurately place reinforcement to meet the following tolerances:

   a. The amount of concrete covering reinforcement in structures shall not deviate from that specified by more than 3/8-inch if the specified cover is more than 2-1/2 inches, nor by more than 1/4-inch if the specified cover is 2-1/2 inches or less.

   b. The spacing of reinforcing bars shall not deviate more than 1 inch from the spacing required on the Contract Drawings.

   c. Concrete covering reinforcement shall be 3 inches for concrete cast directly against the earth, 2 inches for #6 bars and larger and 1-1/2 inches for #5 bars and smaller, unless shown otherwise on the Contract Drawings.

9. Secure reinforcement in position so that it shall not be displaced during the placing of the concrete. Exercise special care to prevent any disturbance of the reinforcement in concrete that has already been placed. Do not field bend or straighten bars, except as approved in writing by the Engineer. Bars bent without approval shall be replaced, at the Contractor's expense, with approved bars that conform to the Contract Drawings. Do not tack-weld reinforcing bars. Use concrete, metal, or other approved material for chairs, hangers, spacers, and other supports for reinforcement. Do not allow portions of such supports to be exposed on concrete surfaces. Unless otherwise shown on the Contract Drawings, allow at least 1 inch between reinforcement and any anchor bolts, form ties, or other embedded metalwork.

END OF SECTION 03 20 00

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SCOPE

This section describes the requirements for furnishing the materials, proportioning, mixing, placing, finishing, protecting, and curing of all cast-in-place concrete to be incorporated in the project Work.

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTALS

A. The Contractor shall make all submittals under provisions of Section 01 33 00.

B. The Contractor shall provide concrete design mixes to the Engineer for approval and in accordance with ACI 318 mix utilized. This shall include the name of the material suppliers, aggregate sizes used, cementitious content, air content, admixtures and quantity, and compressive strength in accordance with ASTM C39. Mix designs shall be approved by Engineer prior to placement of concrete.

C. Submit to the Engineer the manufacturers and specific brand names of all admixtures to be used. Admixtures shall conform to their respective ASTM criteria for acceptance. Submit the manufacturer's product description, instructions, recommended dosage, chloride content, and precautions to be considered when using the admixture.

D. Submit manufacturer's certification which shall contain the following information:

1. Name of admixture, and manufacturer.

2. ASTM designation under which the admixture is formulated.

3. Admixture type.

1.4 APPLICABLE STANDARDS

A. Pertinent provisions of the following referenced standards shall apply to the Work of this Section, except as they may be modified herein, and are hereby made a part of the specifications to the extent referenced.

1. American Concrete Institute

ACI 318 Building Code Requirements for Reinforced Concrete.

2. American Society for Testing and Materials (ASTM):

C31 Making and Curing Concrete Compressive and Flexural Strength Test Specimens in the Field

C33 Concrete Aggregates

C39 Test for Compressive Strength of Cylindrical Concrete Specimens

C94 Ready-Mixed Concrete

C143 Slump of Hydraulic Cement Concrete

C150 Portland Cement

C171 Standard Specifications for Sheet Materials for Curing Concrete

C309 Liquid Membrane - Forming Compounds for Curing Concrete

C403 Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance

C494 Chemical Admixtures for Concrete

D1751 Preformed Expansion Joint Filler for Concrete Paving and Structural Construction

D1752 Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

E329 Specification for Agencies Engaged in the Testing and/or Inspection of Materials

PART 2 - PRODUCTS

2.1 GENERAL

A. Concrete

1. Use concrete composed of cementitious materials (cement and fly ash), sand, coarse aggregate, water, and admixtures specified and approved, all well-mixed and at the proper consistency.

2. Portland cement shall conform to the requirements of ASTM C150 Type I or Type II. Only one brand of cement shall be used throughout the project unless otherwise approved by the Engineer.

B. Nominal Maximum Size of Concrete Aggregate

1. Use coarse aggregate that is as large as practicable, consistent with the required strength, spacing of reinforcement and embedded items, and placement thickness requirements of ACI 318 (Sec. 3.3.3).

C. Consistency

1. To maintain concrete at the proper consistency, adjust the amount of water for concrete to compensate for variation in the moisture content or grading of the aggregates as they enter the mixer. Do not add water to compensate for stiffening of the concrete after mixing. Uniformity of concrete consistency from batch to batch shall be required.

2. If the specified slump is exceeded at placement, the concrete is unacceptable. The use of buckets, chutes, hopers, pumps, transit mix trucks, or other equipment that shall not readily handle and place concrete of the specified slump shall not be permitted.

3. High range water reducers may be used to increase workability at Contractors option upon approval by Engineer. Slump limits specified shall be varied accordingly.

2.2 MIX PROPORTIONS

A. General

1. The Contractor shall be responsible for determining the proportions of ingredients to be used in the concrete for different parts of the Work in accordance with these specifications.

2. Contractor determined concrete mixture proportions shall be submitted to the Engineer for approval. The proportions of all ingredients of each quality of concrete shall be stated. Proportions shall indicate weight of cement and water and weights of aggregates in a saturated surface-dry condition. The submission shall be accompanied by test reports from a laboratory complying with ASTM E329 attesting that proportions thus selected shall produce concrete of the qualities indicated. No substitution shall be made in the source or type of materials used in the work without additional tests to show that the new materials and quality of concrete are satisfactory.

3. If the concrete does not meet the specified 28-day design strength, the concrete shall be rejected. Rejected concrete shall be removed and replaced immediately at the Contractor's expense.

B. Strength

1. Unless otherwise noted, concrete curbs, gutters, valley gutters, sidewalks, driveways, handicap ramps, electrical service pads and streets shall contain five (5) sacks (470 pounds) of cement per cubic yard and shall provide a minimum compressive strength of 3000 pounds per square inch at 28 days.

2. The slump of concrete at placement shall be 2 to 4 inches.

2.3 CHEMICAL ADMIXTURES

A. Do not use chemical admixtures that introduce more than 0.001% chloride, by weight of cementitious materials, in concrete in which aluminum, galvanized metalwork, or prestressed steel is to be embedded.

B. Use an accelerating admixture in all concrete, except as specified otherwise, when the mean daily temperature in the vicinity of the placement has been below 41°F (5°C) for 2 of the 4 days prior to placement. Do not use an accelerating admixture in less severe weather except upon written approval by the Engineer. In requesting such approval, state the reason for using accelerator, the amount and brand of accelerator to be used, and the location of the concrete in which use of the accelerator is proposed.

1. Use an accelerator that conforms to ASTM C494 for Type C or E chemical admixtures. The amount of accelerator used, except for calcium chloride, shall be that amount necessary to affect the requirements of ASTM C494. The Engineer reserves the right to adjust quantities of accelerator used, depending on climatic and other job conditions, and the Contractor shall not be entitled to additional compensation for such adjustment.

2. Calcium chloride shall not be allowed for use as an accelerator.

C. Use a water-reducing, set-controlling admixture, referred to herein as WRA, in all concrete.

1. The WRA shall conform to ANSI/ASTM C494 for Type A or D chemical admixture, except that Type E chemical admixture meeting ANSI/ASTM requirements is an acceptable cold-weather WRA.

2. If use of the WRA is accompanied by abnormal setting of the fresh concrete, or if the WRA does not perform in accordance with these Specifications, furnish and use other brands of WRA until an acceptable admixture is found, as directed by the Engineer.

3. The normal amount of WRA used shall be that necessary to effect the requirements of ANSI/ASTM C494. However, the Engineer reserves the right to adjust the quantities of WRA or eliminate its use, and the Contractor shall be entitled to no additional allowances for such adjustments.

4. A high-range water reducer or superplasticizer, if used, shall conform to ASTM A494, Type A.

2.3 WATER

A. In making and curing concrete and mortar use water that is free from objectionable quantities of silt, organic matter, salts, and other impurities, as determined by the Engineer. The water shall not have a turbidity of more than 50 Nephelometric Turbidity Units (NTU) and shall not contain more than 2,000 parts-per-million (ppm) total solids. Mix water shall not contain more than 1500 ppm soluble sulfate nor more than 1000 ppm of chlorides. The Engineer shall determine whether or not such quantities of impurities are objectionable. Such determination shall usually be made by comparing the compressive strength, water requirement, time of set, and other properties of concrete made with distilled or very clean water, and concrete made with the water proposed for use.

2.4 AGGREGATES

A. For cast-in-place concrete, provide fine and coarse aggregates from pre-approved local aggregate suppliers, from previously excavated and stockpiled sand and rock, or from other Engineer approved sources.

B. Gradation of Aggregates

1. Use sand with a gradation that conforms to the limits designated in ASTM C33 for fine aggregate. Use coarse aggregate with a gradation that contains to the limits designated in ASTM C33 for size No. 57 coarse aggregate for 1-inch MSA and size No. 467 for 1½-inch MSA.

2.5 CURING MATERIALS

A. Curing Compounds: ASTM C309, Type I, Class B which will not discolor concrete nor affect bonding of other finishes applied thereover.

B. Sheet Materials: ASTM C171; waterproof paper, polyethylene film, or white-burlap-polyethylene sheet.

2.6 CONCRETE JOINT MATERIAL

A. Joint Filler

1. Preformed bituminous joint filler shall be non-extruding, bituminous-filler type in accordance with ASTM D1751.
2. Non-Bituminous Type: ASTM D1752, Type I or II, with factory-applied 1/2 in. deep removable top strip of suitable material.

2.7 NON-SHRINK GROUT

A. Grout shall be non-shrink, nonmetallic, dimensionally stable, inorganic, premixed grout.

B. For standard applications use Burke 62 Standard Grout or Engineer approved equal. For applications where forming is impractical use Burke, Damp Pack Grout or Engineer approved equal.

PART 3 - EXECUTION

3.1 QUALITY CONTROL

A. General

1. Contractor shall perform quality control testing or employ an independent testing agency as required, to monitor the conformance of the Work and materials with the requirements of the Contract Documents, in accordance with the provisions of Section 01400, Quality Control and Assurance.

2. Conduct the following tests and inspections, interpret them, evaluate results for compliance with Contract Documents, and report findings to Engineer (and local building authority as required).

3. Provide twelve (12) standard cylinder molds at the Site at all times for making additional cylinders as may be directed by Engineer.

4. Provide slump cone, plate and rod for use on Work at all times.

B. Compression Tests: ASTM C31 and C39. Sample at point of deposit.

1. One (1) set of four (4) cylinders made from single concrete sampling for every 50 cubic yards of each type of concrete used each day.

a. One (1) 7-day break; laboratory cure.

b. Two (2) 28-day breaks; laboratory cure.

c. One (1) 56-day break if 28-day break does not comply; laboratory cure.

C. Slump Test: ASTM C143; first truck each day, test each sample for cylinders.

D. Testing Agency's Reports

1. General: Prepare and forward reports as follows:

a. Engineer: Two (2) copies.

b. Contractor: One (1) copy.

c. Building Authority: One (1) copy (if required).

2. Compression Tests: In addition to reporting as outlined in ASTM C39, present the following data in tabular forms and distribute immediately after recording test results. Notify Engineer by telephone on date test is performed of test results which are not in compliance with Contract Documents.

a. Identity of job, Contractor, Supplier.

b. Identity of mix and required strength.

c. Placement location of sampled concrete.

d. Slump, truck number, time and date sampled, air temperature, concrete temperature, consistency.

e. Curing history.

f. Date tested.

g. Compressive strength.

h. Type of fracture.

i. Compliance with Contract Documents (yes or no).

3.2 GENERAL

A. Locate structures as shown on the Contract Drawings or as otherwise directed by the Engineer. Build structures to the prescribed lines, grades, and dimensions. The dimensions of each structure as shown on the Contract Drawings shall be subject to modifications as deemed necessary by the Engineer to adapt the structure to the conditions disclosed by the excavation or to meet other conditions. No additional allowance above the Contract Price shall be made due to the dimensions fixed by the Engineer or any minor modifications or extensions to adapt the structures to the structure site, as determined by the Engineer.

B. Construct construction joints as shown on the Contract Drawings.

C. The Contractor shall employ a foreman experienced in this class of work.

D. The Contractor shall supervise the placing of all concrete and concrete-related materials and shall see that the Work is carried out strictly in accordance with the Contract Drawings and these Specifications.

H. The Contractor shall not permit loading or traffic of any kind on structure until the concrete has cured a minimum of seven (7) days.

I. The Contractor shall notify Engineer at least 24 hours in advance of any concrete placement. The Engineer shall be present during concrete placement.

J. The Contractor is responsible to coordinate with all trades to provide a complete and proper installation of all embedded items. The Engineer shall be given sufficient advance notice and opportunity to inspect all embedded items before concrete is placed.

3.2 PREPARATIONS FOR PLACING

A. General

1. Do not place concrete until all formwork, installation of embedded items, and preparation of placement surfaces have been approved by the Engineer.

2. The Engineer shall monitor the Work during and after completion of each phase of the preparations.

3. Ensure that all surfaces of forms and embedded materials are free from curing compound, dried mortar from previous placements, and other foreign substances before the adjacent or surrounding concrete placement is begun.

4. Before beginning concrete placement, supply a sufficient number of properly operating vibrators and operators and additional replacement vibrators, as approved by the Engineer.

B. Foundation Surfaces

1. All surfaces upon or against which concrete is to be placed shall be free from frost, ice, water, mud, and debris.

2. Rock surface shall be free from oil, objectionable coatings, and loose, semidetached and unsound fragments regardless of their degree of anchorage. Immediately before concrete placement, clean rock surfaces as required and directed.

3. Earth foundations shall be damp when concrete is placed. Nonporous earth subgrades shall be moist to a depth of approximately 1 inch, and free-draining subgrades shall be moist to a depth of approximately 3 inches.

3.3 PLACING

A. General

1. Prepare all surfaces upon or against which concrete is to be placed as specified in Section 3.2

2. Do not re-temper concrete. Waste all concrete that has become too stiff for proper placement.

3. Do not place concrete in standing water except with Engineer's written permission. Do not place concrete in running water or subject it to running water until hardened.

4. Deposit concrete as nearly as practical in its final position and in so depositing there shall be no vertical drop greater than 5 feet, except where suitable equipment is provided to prevent segregation and where specifically authorized by the Engineer. Do not allow the concrete to flow in such a manner that the lateral movement shall cause segregation of the coarse aggregate from the concrete mass. Employ methods and equipment for depositing concrete in forms that minimize clusters of coarse aggregate.

5. Monitor forms constantly and adjust their position as necessary during concrete placement in accordance with Section 03020.

6. Place all concrete, except concrete placed on unformed slopes, in horizontal layers. The depths of vibrated layers shall not exceed 24 inches. The Engineer may require lesser depths of layers where concrete cannot otherwise be placed and consolidated in accordance with these Specifications. Make all construction joints that intersect exposed concrete surfaces straight and level or plumb except as shown otherwise on the Contract Drawings.

7. To facilitate consolidation and bond at construction joints, either begin structural concrete placements with an oversanded mix or vibrate the concrete immediately above the joint twice as long as normally needed for concrete of that consistency.

8. Avoid Class 2 joints when placing concrete in any part of the Work. A Class 2 joint (ASTM C403 final set) is an unplanned joint resulting when a concrete surface has set and is no longer capable of being re-vibrated before the next batch is placed against it. Treat all Class 2 joints a construction joints in accordance with 3.5.A.

9. Do not place concrete in rain sufficiently heavy or prolonged to wash mortar from concrete or to result in a Class 2 joint.

10. No additional payment shall be made over the Contract Price for concrete due to any limitations, delays or replacement resulting from the placing of concrete required under the provisions of this Section.

B. Transportation of Concrete

1. Use methods and equipment for transporting concrete from the batch plant to its final placement that do not cause measurable segregation of coarse aggregate or slump loss exceeding 2 inches.

2. Use buckets, chutes, conveyors, or concrete pumps to deposit concrete as near as practical to its final position. Do not use aluminum pipe or aluminum chutes to deliver concrete. Use concrete buckets capable of promptly discharging the concrete, and a dumping mechanism capable of consecutively discharging at one location small portions of concrete from a full bucket. Use buckets and conveyors designed for attaching drop chutes or tremies to deposit concrete whenever concrete must be dropped more than 5 feet from the bucket to the placing surface.

3. Equip concrete pumps with slicklines having a minimum diameter of 5 inches. Use pumps and slicklines capable of transporting concrete containing a maximum amount of coarse aggregate and a minimum amount of sand, cement, and water. The minimum proportion of 3/4- to 1-1/2-inch aggregate shall be 5-1/2 cubic feet (solid volume) per cubic yard of concrete. This proportion may be increased, depending upon the shape and texture of the aggregate utilized, and as determined by the Engineer.

4. Use buckets, chutes, hoppers, pumps, transit mix trucks, and other equipment that readily handles and places concrete of the specified slump. Replace inadequate transporting equipment, as determined by the Engineer, with acceptable equipment.

5. Truck mixers used in the Work shall have an accurate water meter that has a dial or digital indicator located between the supply tank and mixer. Locate near the water meter a reliable revolution counter that can be readily reset to zero to record the total number of revolutions of the drum for each batch.

6. Truck mixers used in the Work shall have an affixed metal plate that indicates drum volume, for both mixing and agitating, and maximum and minimum drum rotation speeds.

7. Continue mixing for not less than 50 revolutions nor more than 100 revolutions of the drum after all the ingredients are in the drum; 5% of the water may be withheld. Use a minimum mixing speed of 12 revolutions per minute. After mixing is completed, use the equipment manufacturer's designated agitation speed for additional revolutions. After withheld water is added, mix at the specified mixing speed for a minimum of 30 revolutions. Do not exceed the design water content. After a period of agitation, a few drum revolutions at mixing speed shall be required just before discharging.

8. Discharge concrete within 1-1/2 hours after the introduction of mix water and cementitious materials into the mixer. Include with each concrete batch delivered from commercial ready-mix plants, a written certificate of batch component weighs and batching time.

C. Consolidation of Concrete

1. Consolidate concrete to remove all undesirable air voids from the concrete, including air voids trapped against the forms and construction joints, to eliminate rock pockets and honeycomb areas, and to force the concrete snugly against all surfaces of forms, construction joints, and embedments. Additional effort may be required to adequately consolidate concrete adjacent to construction joints and sloping surfaces. Such additional effort shall be at the Contractor's expense.

2. Use immersion-type vibrators, in nearly vertical position, to consolidate concrete. The vibrating head shall penetrate and re-vibrate the concrete in the upper portion of the underlying layer. Avoid contact of the vibrating head with embedded items and with formed surfaces that shall later be exposed to view. Do not place concrete upon previously placed concrete that has not been thoroughly consolidated.

3. Operate immersion-type vibrators at speeds of at least 7,000 revolutions per minute when immersed in concrete. Immediately replace improperly operating vibrators with acceptable vibrators.

3.4 JOINTS AND GROUT

A. Construction Joints

1. A construction joint is a planned joint where two placements of concrete meet, across which development and maintenance of bond are required, and through which any reinforcement that may be present is not interrupted. Roughen all construction joints and remove all laitance in preparation for adjoining concrete. Methods of roughening the surface and removing laitance may include mechanical abrasion, bushhammering, sandblasting, acid etching, or high-pressure water jetting of hardened (not green) concrete; all methods are subject to the approval of the Engineer.

2. Thoroughly clean construction joint surface of loose or defective concrete, coatings, sand, curing compound, and other foreign material.

3. After this initial cleanup of previously placed concrete and at the last opportunity before placing additional concrete, thoroughly wash the existing concrete surface with water or air-water jets, and uniformly surface-dry.

B. Contraction Joints

1. Thoroughly clean all contraction joint surfaces of accretions of concrete or other foreign material by scraping, chipping, or other means approved by the Engineer, before application of wax-base curing compound to contraction joints. Remove curing compound from the joints immediately prior to placement of adjoining concrete. Waterstops, reinforcing bars, and other

embedded items shall be free of curing compound when adjoining concrete is placed.

2. Fill contraction joints on hydraulic structures with primer and polysulfide joint sealants, as shown on the Contract Drawings, in accordance with the manufacturer's recommendations.

C. Expansion Joints

1. Fill expansion joints with either preformed bituminous joint filler, expanded polystyrene, closed cell neoprene, or sponge rubber joint filler, as shown on the Contract Drawings.

D. Joint Filler

1. Cut filler to the size and shape of the joint surface. Secure the filler to the concrete either with copper nails embedded in the first-placed concrete such that the nails protrude from the joint surface to be covered on approximately 12-inch centers, or with adhesive applied between the filler and the first-placed concrete.

2. Tighten joints between adjoining portions of filler to prevent concrete from seeping through the joints. Unless otherwise shown on the Contract Drawings or as directed by the Engineer, place the edges of the sponge rubber filler flush with the finished surface of the concrete or to the bottom edge of chamfers. Place sealants according to the manufacturer's recommendations.

E. Nonshrink Grout

1. Apply grout as required on the Contract Drawing in accordance with grout manufacturer's printed instructions.

3.5 FINISHES AND FINISHING

A. General

1. Unless otherwise noted, concrete, curbs, gutters, valley gutters, sidewalks, driveways, handicap ramps, and streets shall be finished to match existing adjacent concrete finishes.

3.6 CURING

A. General

1. Furnish all materials and perform all work required for curing concrete.

2. Cure all concrete either by water curing or by using wax-base or water-emulsified, resin-base curing compound, except as otherwise provided below.
3. Cure curbs, gutters, valley gutters, sidewalks, driveways, handicap ramps, and streets by water curing, by covering with polyethylene film, or by water-emulsified, resin-base curing compound.

4. All curing methods are subject to approval by the Engineer.

B. Water Curing

1. Keep concrete surfaces to be cured wet by covering them with water-saturated material; by using a system of perforated pipes, mechanical sprinklers, or porous hoses; or by other methods that shall keep all surfaces continuously wet.

2. Keep water-cured concrete wet for at least 7 days from the time the concrete has attained sufficient set to prevent detrimental effects to the concrete surfaces.

C. Wax-Base or Water-Emulsified, Resin-Base Compound Curing

1. Apply wax-base or water-emulsified, resin-base compound to designated concrete surfaces to provide a water-retaining film. Reapply the curing compound as necessary to maintain a continuous, water-retaining film on the surfaces for 28 days.

2. In order to assure bond of curing compound, remove excessive form oil from concrete surfaces by washing with a suitable washing solution approved by the Engineer, followed by a thorough rinsing of the surfaces with clear water. The washing solution shall be required only if the Engineer determines that the amount of form oil on the concrete shall impair the bond of the curing compound.

3. Where curing compound is to be applied, keep formed concrete surfaces continuously moist by repeated light spraying with water until immediately before application of curing compound. Apply curing compound as soon as the surface film of moisture has disappeared but while the concrete still has a damp appearance.

4. Thoroughly mix the curing compound and spray-apply to the concrete surfaces in one coat to provide a continuous, uniform film over the concrete. The coverage shall not exceed 150 square feet per gallon. On rough surfaces, decrease the coverage rate as necessary to obtain the required continuous film. Ensure ample coverage of the compound at edges, corners, and rough surfaces. Keep curing compound off waterstops and reinforcing bars.

D. Polyethylene Film Curing

1. As soon as the concrete has hardened sufficiently to prevent damage, thoroughly moisten all surfaces by spraying lightly with water. Apply polyethylene film to the designated concrete surfaces to provide an airtight, water-retaining film over the entire concrete surface. Lap edges of the polyethylene strips to effect a seal to adjacent strips and, at the extreme edge of the curing area, hold tightly against the concrete surface.

2. Maintain curing compound membranes to provide a moisture-proof membrane for curing concrete for the minimum period specified. Repair without delay curing compound that is damaged, or that peels from concrete

surfaces within 14 days after application, by moistening the concrete and applying additional compound in a manner satisfactory to the Engineer.

3. Maintain polyethylene film curing for at least 14 days. Protect the polyethylene film as necessary to keep it intact, and keep the concrete surface moist for the full curing period. Adequately secure the polyethylene film to withstand wind and to prevent circulation of air inside the curing film. Protect the curing membrane by covering with sand or earth not less than 1 inch thick, with plywood, or by other effective means approved by the Engineer, where foot traffic or other construction activity is necessary on concrete being cured by curing compound or polyethylene film. Do not place protective covering on curing compound until the compound is dry. Remove protective coverings before final acceptance of the Work.

END OF SECTION 03 30 00

SECTION 11 90 01

AIR COMPRESSOR

PART 1 - GENERAL

1.1 SCOPE

A. This specification defines the technical requirements for the supply and installation of a 15-Hp rotary vane compressor, control panel, pressure relief valve, and all required accessories.

B. Should there be any conflict between any specification and/or data sheets, the order of precedence shall be:

1. Equipment Data Sheet

2. This Specification

3. Reference Specifications

1.2 DESCRIPTION

A. Air Compressor

The air compressor shall be a Rietschle, model DTB (06) MACRO,15 horsepower (hp), dry running, rotary vane, direct drive, air compressor with dual rotor bearings, flange motor with bolt couplings, and air cooled or engineer approved equivalent. The compressor is fitted with a paper inlet filter, suction silencer, and pressure regulating valve. The motor shall be a 230/460-volt three-phase, 60 Hz, 1800 rpm, TEFC motor.

B. Compressor Control Panel

The compressor control center panel shall provide means to monitor the operation of the air compressor, system control valves, and system operating parameters. Limited system control will be achieved using a remote telemetry system.

C. Pressure Relief Valve

The pressure relief valve shall be an in line with pressure gauge. Pressure range shall be between 5 and 30-psi.

1.3 SUBMITTALS

A. The Contractor shall make all submittals under provisions of section 01300.

B. Product Data: Submit manufacturers technical product data for rotary vane compressor including air flow and pressure ratings showing dimensions, weights, capacities, ratings, performance curves with operating point clearly indicated, motor electrical characteristics, gauges and finishes of materials, installation instructions, and sound power level ratings by octave band based on sound measurement procedures guided by ANSI S1.12, Methods for the Measurement of Sound Pressure

Levels, and ANSI S1.30, Guidelines for the Use of Sound Power Standards and for the Preparation of Noise Test Codes.

C. Shop Drawings: Submit assembly-type shop drawings showing unit dimensions, weight loadings, required clearances, construction details, and field connection details.

D. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to fans/blowers. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory installed and portions to be field installed.

E. Maintenance Data: Submit maintenance instructions, including instructions for lubrication, motor and drive replacement, and spare parts lists. Include this data, product data, shop drawings, and wiring diagrams in maintenance manuals.

F. Certifications:

1. Provide rotary vane compressor electrical components that have been listed and labeled by UL.

2. All rotary vane compressor ratings shall be based on tests made by the manufacturer's standard test methods. These test methods shall be approved by the purchasing agent prior to compressor purchase.

1.4 APPLICABLE STANDARDS

Codes, specifications, and standards referred to by number or title shall form a part of this specification to the extent required by the reference thereto:

A. AMCA

Amca 99, Standards

B. ASME

B19.1 Safety Standards for Air Compressor Systems

C. ISO

ISO 10440-2:2001, Petroleum and natural gas industries - Rotary-type positive-displacement compressors

ISO 2151:2004, Acoustics - Noise test code for compressors and vacuum pumps - Engineering method (Grade 2)

ISO 5388:1981, Stationary air compressors - Safety rules and code of practice

PART 2 - PRODUCTS

2.1 GENERAL

A. Materials and products shall be first quality, new, and be furnished in strict accordance with this specification.

B. The compressor shall be a Rietschle, model DTB (06) MACRO,15 horsepower (hp), dry running, rotary vane, direct drive, air compressor or engineer approved equivalent provided in accordance with the requirements of this section as indicated below:

1. Dual rotor bearings, flange motor with bolt couplings, and air cooled.

2. A 230/460-volt three-phase, 60 Hz, 1140 rpm, TEFC motor.

3. Full-voltage magnetic starter, NEMA 4 mounted and wired.

4. Heavy duty steel base frame.

5. Paper inlet particulate filter.

6. Air discharge check valve.

7. In-line suction silencer.

8. High pressure safety relief valve.

9. High air/fluid temperature shutdown systems.

10. Motor overload shutdown.

B. The control center panel shall be provided in accordance to the requirements of this section as indicated below:

1. Operating temperature and pressure indicators.

2. Operating mode indicator.

3. Phase monitoring of power to compressor.

4. Time to service indicator.

5. Total running and loaded hours indicator.

6. Telemetry system providing remote control of air compressor operating parameters.

2.2 DESIGN CRITERIA

A. Air Compressor

1. The air compressor shall move the quantity of air at the temperature and pressure ratings designated on the Equipment Data Sheet.

2. The air compressor shall be fully assembled.

3. The air compressor shall be provided with vibration isolation devices as specified by the manufacturer.

4. The compressor shall provide air flow from 80 to 125 scfm at operating pressures between 0 and 25 psi.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install compressor in accordance with drawings and the manufacturer's instructions. Mount the compressor to the foundation level and plumb. Fill any grout holes with grout. After the grout has cured, secure the compressor to the concrete floor with anchor bolts.

B. Piping connections for the compressor shall be completed with 2" schedule 40, galvanized steel piping and shall be done in accordance with manufacturer's recommendations.

C. Adjusting, Cleaning, and Protecting:

1. Clean compressor interior and exterior to remove foreign material and construction dirt and dust.

2. Repair interior and exterior finishes and coatings damaged during shipping, handling and installation.

3.2 QUALITY CONTROL

Oversight will be performed by the Owner's representative to verify compliance of the work to the drawings and specifications.

3.3 COMMISSIONING

A. Final checks before start-up: Perform the following operations and checks before start-up:

1. Remove shipping blocking and bracing.

2. Verify unit is secure on mountings and supporting devices and that connections for piping, ductwork, and electrical are complete.

3. Verify proper thermal overload protection is installed in motors, starters, and disconnects.

4. Perform cleaning and adjusting specified in this Section.

5. Verify proper motor rotation direction, and verify free rotation and smooth operation.

6. Lubricate moving parts with factory-recommended lubricants.

B. Starting procedures for compressor:

1. Energize motor; verify proper operation of motor and drive system.

2. Measure and record motor electrical values for voltage and amperage.

END OF SECTION 11 90 01

SECTION 11 90 02

VACUUM BLOWER

PART 1 - GENERAL

1.1 SCOPE

A. This specification defines the technical requirements for the supply and installation of a regenerative vacuum blower with a silencer.

B. Should there be any conflict between any specification and/or data sheets, the order of precedence shall be:

1. Equipment Data Sheet

2. This Specification

3. Reference Specifications

1.2 DESCRIPTION

A. Vacuum Blower

The vacuum blower shall be a Rietschle, Bora, Model 380, 6.4 HP, 230/460 V, 3 phase, regenerative, side channel blower, or an Engineer approved equal. The blower shall be capable of 200 scfm of air at 60 inches of water.

B. Vacuum Blower Control Panel

The vacuum blower control center panel shall provide means to monitor the operation parameters of the blower. System control parameters include temperature, pressure, air flow differential pressure, and run time.

1.3 SUBMITTALS

A. The Contractor shall make all submittals under provisions of section 01300.

B. Product Data: Submit manufacturers technical product data for regenerative, side channel blower including air flow and pressure ratings showing dimensions, weights, capacities, ratings, performance curves with operating point clearly indicated, motor electrical characteristics, gauges and finishes of materials, installation instructions, and sound power level ratings by octave band based on sound measurement procedures guided by ANSI S1.12, Methods for the Measurement of Sound Pressure Levels, and ANSI S1.30, Guidelines for the Use of Sound Power Standards and for the Preparation of Noise Test Codes.

C. Shop Drawings: Submit assembly-type shop drawings showing unit dimensions, weight loadings, required clearances, construction details, and field connection details.

D. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to fans/blowers. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory installed and portions to be field installed.

E. Maintenance Data: Submit maintenance instructions, including instructions for lubrication, motor and drive replacement, and spare parts lists. Include this data, product data, shop drawings, and wiring diagrams in maintenance manuals.

F. Certifications:

1. Provide regenerative blower electrical components which have been listed and labeled by UL.

2. All regenerative blower ratings shall be based on tests made by the manufacturer's standard test methods. These test methods shall be approved by the purchasing agent prior to blower purchase.

1.4 APPLICABLE STANDARDS

Codes, specifications, and standards referred to by number or title shall form a part of this specification to the extent required by the reference thereto:

A. AMCA

AMCA 99, Standards

AMCA 210, Laboratory Methods of Testing Fans for Ratings

AMCA 301, Methods for Calculating Fan Sound Rating from Laboratory Test Data

B. UL

507 Electric Fans

PART 2 - PRODUCTS

2.1 GENERAL

A. The vacuum blower shall be a Rietschle Bora model SAP 380 regenerative, side channel or engineer approved equivalent provided in accordance with requirements of this Section and as indicated below:

1. 6.4 HP, 1140 rpm, 60 Hz, 230/460 V, 3 phase inverter ready TEFC motor.

2. Integral inlet filter with paper element.

3. Integral silencer and suction mesh

2.2 DESIGN CRITERIA

A. The blower shall move the quantity of air at the temperature and pressure ratings designated on the Equipment Data Sheet.

B. The blower shall be mounted and fully assembled on a common support frame for installation.

C. The blower shall be provided with vibration isolation devices as specified by the manufacturer.

D. The blower shall be capable of 200 scfm at a blower vacuum of 60 inches of H_2O.

PART 3 - EXECUTION

3.1 BLOWER INSTALLATION

A. Install blower in accordance with drawings and the manufacturer's instructions. Mount the blower base to the foundation level and plumb. Fill the grout hole in the blower base with grout. After the grout has cured, secure the blower mounting base to the concrete floor with anchor bolts.

C. Piping connections for the blower shall be completed using 3" schedule 40 PVC pipe and fittings at the vacuum side. Discharge piping shall be 2" schedule 40, galvanized steel pipe and fittings.

D. Adjusting, Cleaning, and Protecting:

1. Clean vacuum blower interior and exterior to remove foreign material and construction dirt and dust.

2. Repair interior and exterior finishes and coatings damaged during shipping, handling and installation.

3.2 QUALITY CONTROL

Oversight will be performed by the Owner's representative to verify compliance of the work to the drawings and specifications.

3.3 COMMISSIONING

A. Perform the following operations and checks before start-up:

1. Remove shipping blocking and bracing.

2. Verify unit is secure on mountings and supporting devices and that connections for piping, ductwork, and electrical are complete.

3. Verify proper thermal overload protection is installed in motors, starters, and disconnects.

4. Perform cleaning and adjusting specified in this Section.

5. Verify proper motor rotation direction, and verify blower wheel free rotation and smooth bearings operation.

6. Lubricate bearings, sheaves, belts, and other moving parts with factory-recommended lubricants as necessary.

B. Starting procedures for blower:

1. Energize motor; verify proper operation of motor and blower.

2. Adjust make-up air valve to indicated vacuum and flow rate..

3. Measure and record motor electrical values for voltage and amperage.

END OF SECTION 11 90 02

SECTION 11 90 03

AIR/WATER SEPARATOR

PART 1 - GENERAL

1.1 SCOPE

A. This specification defines the technical requirements for the supply and installation of an air/water separator.

B. Should there be any conflict between any specifications and/or data sheets, the order of precedence shall be:

1. Equipment Data Sheet

2. This Specification

3. Reference Specifications

1.2 DESCRIPTION

The air/water separator shall be a Rotron Model MS350BS air/water separator or engineer approved equivalent with 3” NPT air inlet, 4.5” PVC air outlet, and 1” NPT water drain. The air/separator shall be capable of handling 350 scfm.

1.3 SUBMITTALS

A. The contractor shall make all submittals under provisions of Section 01300.

B. Product data including rated capacities (nominal capacity, actual capacity, and pressure rating) of selected model, weights (shipping, installed, and operating), furnished specialties, and accessories. Indicate dimensions, wall thicknesses, required clearances, methods of assembly of components, and piping connections.

C. The following documentation:

1. Dimensional drawing

2. Instructions and manuals

3. Parts List

4. Cross-sectional Drawings

5. Bill of Materials

6. Weights, Forces, and Calculations.

7. Material Certifications

8. ASME Code Data (where required)

1.3 APPLICABLE STANDARDS

Codes, specifications, and standards referred to by number or title shall form a part of this specification to the extent required by the reference thereto:

A. American National Standard Institute

B16.5 Pipe Flanges and Flanged Fittings

B1.1 Unified Screw Threads

B. American Society for Testing and Materials

ASTM Book of Standards, Volume 01.01: Steel Piping, Tubing and Fittings.

C. AWWA

D100 Standard for Welded Steel Tanks for Water Storage

D102 Standard for Painting Steel Water-Storage Tanks

D. Federal Occupational Safety and Health Regulations

PART 2 - PRODUCTS

2.1 GENERAL

A. Materials and products shall be first quality, new, and be furnished in strict accordance with this specification.

B. Manufacturer shall deliver the silencer separator shop-assembled such that there will be minimum field assembly required.

C. All components and options shall meet requirements specified on the Equipment Data Sheet.

2.2 EQUIPMENT DESIGN REQUIREMENTS

A. The separator shall be a 23” diameter x 54.5” high steel vessel.

B. The air inlet shall be located at 9.75” on center from the top of tank and 28” from the bottom of the tank. The inlet shall be a 3" NPT fitting.

C. The air outlet shall be located at center of the top of the vessel and shall be a 4.5" Schedule 40 PVC welded socket fitting.

D. The water outlet shall be located at the center of the bottom of the vessel and shall be a 1” NPT fitting.

E. There shall be a low-level switch port which will accept a 1-inch female threaded galvanized pipe, located 2-inches above the water discharge flange. The port shall be plugged upon delivery.

F. There shall be a high-level switch port which will accept a 1-inch female threaded

galvanized pipe, located 6.5-inches above the low-level switch port. The port shall be plugged upon delivery.

G. There shall be a high-level alarm port which will accept a 1-inch female threaded galvanized pipe, located 2-inches below the air inlet nozzle. This port shall be plugged upon delivery.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install air/water separator in accordance with manufacturer’s instruction.

B. Piping connections to be completed with 3” Schedule 40 PVC and shall be done according to manufacturer’s recommendations.

3.2 QUALITY CONTROL

All equipment shall be furnished in accordance with this specification, the Equipment Data Sheet, and the Contract Documents. The air/water separator shall be installed in accordance with the manufacturer's recommendations.

3.3 COMMISSIONING

A. The unit shall be inspected at the manufacturer's facility following the manufacturer's written standard procedures. The manufacturer is responsible for any third party inspections required by law or specifications.

B. The unit shall be given a mechanical running test following manufacturer's written procedures.

C. Owner reserves the right to witness testing at the manufacturer's facility. Witnessing of the test does not constitute a waiver of requirements, nor does it relieve the manufacturer of any responsibility.

D. Additional testing shall be specified on the Equipment Data Sheet as required.

END OF SECTION 11 90 03

SECTION 11 90 04

GRANULAR ACTIVATED CARBON UNITS

PART 1 - GENERAL

1.1 SCOPE

A. This specification defines the technical requirements for the supply and installation of two granular activated carbon (GAC) units.

B. Should there be any conflict between any specifications and/or data sheets, the order of precedence shall be:

1. Equipment Data Sheet

2. This Specification

3. Reference Specifications

1.2 DESCRIPTION

The GAC units shall be Carbonair Model GPC 20R or Engineer approved equivalent containing 2,000 lbs of activated carbon, with 8 5/8" O.D. pipe nozzles and a 24" access port. The GAC units will have an air flow range of 200 to 1800 scfm.

1.3 SUBMITTALS

A. The contractor shall make all submittals under provisions of Section 01300.

B. Product data including rated capacities (nominal capacity, actual capacity, and pressure rating) of selected model, weights (shipping, installed, and operating), furnished specialties, and accessories. Indicate dimensions, wall thicknesses, required clearances, methods of assembly of components, and piping connections.

C. The following documentation:

1. Dimensional drawing

2. Instructions and manuals

3. Parts List

4. Cross-sectional Drawings

5. Bill of Materials

6. Weights, Forces, and Calculations.

7. Material Certifications

8. ASME Code Data (where required)

1.3 APPLICABLE STANDARDS

Codes, specifications, and standards referred to by number or title shall form a part of this specification to the extent required by the reference thereto:

A. American National Standard Institute

B16.5 Pipe Flanges and Flanged Fittings

B1.1 Unified Screw Threads

B. American Society for Testing and Materials

ASTM Book of Standards, Volume 01.01: Steel Piping, Tubing and Fittings.

C. AWWA

D100 Standard for Welded Steel Tanks for Water Storage

D102 Standard for Painting Steel Water-Storage Tanks

D. Federal Occupational Safety and Health Regulations

PART 2 - PRODUCTS

2.1 GENERAL

A. Materials and products shall be first quality, new, and be furnished in strict accordance with this specification.

B. Manufacturer shall deliver the silencer separator shop-assembled such that there will be minimum field assembly required.

C. All components and options shall meet requirements specified on the Equipment Data Sheet.

2.2 EQUIPMENT DESIGN REQUIREMENTS

A. The GAC units shall be 5.0’ diameter x 7’2”” high and constructed of 10 gauge steel.

B. The air inlet shall be located at 5.0” on center from the bottom of tank. The inlet shall be 8 5/8" O.D. flanged steel pipe.

C. The air outlet shall be located at center of the top of the vessel and shall be a 8 5/8" O.D. flanged steel pipe.

D. The vessel shall be welded to 3/16” plate and attached to welded steel fork tubes.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install GAC units in accordance with manufacturer’s instruction

B. Piping connections to be completed with 3” Schedule 40 PVC and shall be done according to manufacturer’s recommendations.

3.2 QUALITY CONTROL

All equipment shall be furnished in accordance with this specification, the Equipment Data Sheet, and the Contract Documents. The GAC units shall be installed in accordance with the manufacturer's recommendations.

3.3 COMMISSIONING

A. The units shall be inspected at the manufacturer's facility following the manufacturer's written standard procedures. The manufacturer is responsible for any third party inspections required by law or specifications.

B. The units shall be given a mechanical running test following manufacturer's written procedures.

C. Owner reserves the right to witness testing at the manufacturer's facility. Witnessing of the test does not constitute a waiver of requirements, nor does it relieve the manufacturer of any responsibility.

D. Additional testing shall be specified on the Equipment Data Sheet as required.

END OF SECTION 11 90 04

SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL

PART 1. GENERAL

1.1 SCOPE

A. Work to be performed under this specification includes all labor, materials and equipment required to install a complete electrical system as described in these specifications and as shown on the Drawings.

B. All labor, materials and equipment shall also be subject to all applicable sections of Division 00 and Division 01 forming a preface and are a part of these specifications.

C. Work Not Included:

1. In general, all motors will be furnished with equipment, and will be installed by others. Provide all motor connections as shown on the Drawings and as specified herein. Furnish disconnecting devices as indicated and as required by National Electrical Code (N.E.C).

2. Do not paint electrical equipment unless specifically noted otherwise.

3. Electrical work required under the scope of another Contractor, by Owner, or all other work that is clearly not shown on the Drawings or indicated in the specifications, is therefore not apart of this contract.

4. In general, controls for equipment will be by the Equipment Supplier unless specified otherwise. Control wiring between equipment and remote devices, motor controls, and etc. as noted or as shown on the Drawings shall be supplied by CONTRACTOR.

1.2 DESCRIPTION

(NOT USED)

1.3 SUBMITTALS

A. The Contractor shall make all submittals under provisions of Section 0133 00.

B. Shop Drawings

1. Submit three copies of shop drawings to ENGINEER for review before fabrication and installation. Shop drawings shall include, but not necessarily limited to schematics, wiring diagrams, dimensions, performance data and any other information required by these specifications or as considered necessary by ENGINEER.

2. Review by ENGINEER is only for conformance with the design concept of the project and compliance with the specifications and Drawings.

ENGINEER's review does not in any way relieve CONTRACTOR, manufacturer or supplier from the responsibility for furnishing materials and performing the work in conformance with the Drawings and specifications and in a safe manner.

3. Prior to submission, carefully check all data for compliance with specifications. He shall also indicate only that material which is applicable by circling catalog numbers, Drawings, etc., to clearly indicate his intent.

4. Shop drawings shall indicate job name, date, and CONTRACTOR. Shop drawings shall be submitted in a group for a particular system or category (i.e., lighting fixtures, service equipment, etc.) in brochure form with index or list of equipment. No consideration will be given data not submitted in accordance with the above.

5. The manufacturers of materials indicated in the bid documents shall be used in the base bid. If an "approved equal" is desired to be used, it shall be bid as an alternate to the base bid. Attach to the proposal form, sheet(s) with a brief description of the materials (including source of manufacturer, model number, basic ratings, etc.) along with an "addition to" or "deduct from" the base bid noted on the attached sheet(s).

1.4 APPLICABLE CODES, STANDARDS, AND WORKMANSHIP

A. All work shall conform to requirements of Illinois State Electrical Code and any local codes and regulations that may apply.

B. All materials shall be new and shall meet requirements of Underwriters Laboratories wherever standards have been set for items in question and shall meet minimum standards of IEEE, ASA, ANSI, NEMA and ASTM.

C. All work shall be installed in accordance with NECA standards of installation.

D. All Permits and inspection fees shall be paid for by CONTRACTOR.

E. All work shall conform where applicable to the Williams-Steiger Occupational Safety and Health Act of 1970 (OSHA), Part 1910, "Occupational Safety and Health Standards".

F. Install all equipment and fixtures forming part of the work of this section in complete accordance with the manufacturers' recommendations.

PART 2. PRODUCTS

2.1 RACEWAY AND FITTINGS

A. All conduit shall be EMT, sizes as shown on the drawings, ½-inch minimum, subject to National Electrical Code fill limitations. Conduit shall be manufactured by Republic Steel, National Electric Products, Youngstown, Triangle, Allied or approved equal.

B. PVC conduit (heavy wall - Schedule 40) may be used when encased in concrete, when buried below slab, or when underground except under driveways or parking lots unless encased in concrete. Provide a 6-inch sand cushion all around PVC conduit buried in the ground as shown on the drawings. All PVC conduits shall be buried at least 24 inches below grade unless required by code to be greater or where indicated to be greater on the drawings. Provide a separate ground wire in each PVC conduit. Provide insulation bushing or bell-ends on both ends of conduit (unless connected to steel conduit) to prevent damage to wire or cable. See drawings for conduit sizes.

C. Each piece of conduit shall be straight, free from internal and external defects, of uniform wall thickness and accurate circular cross section throughout. Use sealing fittings at all box entrances.

D. Each 10 feet length of conduit shall be labeled with an Underwriter's Laboratory label showing the manufacture's name and/or trademark.

E. All conduits shall be free from all burrs and shall be swabbed to remove all foreign matter.

F. Couplings and connectors for electrical metallic tubing shall be watertight and compression type. Set screw and indenter type fittings are not acceptable.

G. All exposed conduit (utility areas) shall be run parallel or perpendicular to building walls. Any conduit run under floor slab shall be heavy wall, galvanized rigid steel unless noted otherwise herein.

H. Provide a threaded, insulated grounding bushing for all conduits utilized for feeders from and to panelboards, motor controls and all other feeders 100 amperes or greater.

I. Final conduit connections to motors and any other equipment subject to vibration shall be with greenfield (for dry area) or PVC-jacketed greenfield (for wet, exterior or finished areas).

J. Where conduits pass through exterior walls or footings below grade, the entrance shall be made watertight.

K. Conduits passing through masonry structures shall be either sleeved allowing 1/2 inches clearance on each side of the conduit or be wrapped with 3M #50 Scotch wrap tape if embedded in the masonry.

L. Conduits shall not be secured to or come in contract with pipes. Pipe flange bolts and equipment bolts shall not be used to anchor conduits or conduit supports. Conduits shall be supported by piping or other conduits. Conduits shall clear heated surfaces, heated pipes, and insulation by at least 6 inches.

M. All raceway systems shall be cleaned of debris and moisture prior to installing electrical conductors.

N. Where conduit passes between areas subject to different temperatures, the conduit shall be sealed to prevent interchange of air and formation of condensation. This

shall be done by use of a conduit fitting and Duxseal or other approved removable mastic material.

O. Where making a transition from PVC conduit to heavy wall steel conduit, use only UL labeled PVC fitting designed as a transition fitting, maintaining the watertightness of the conduit system.

2.2 WIRE AND CABLES

A. All conductors for 120V through 480V systems shall be rated 600 volts, and shall be stranded copper unless noted otherwise. Minimum wire size shall be #12 AWG unless specifically indicated otherwise.

B. Wire insulation for all 120V through 480 volt distribution, power, lighting and control shall be 600V, 75 C, THWN or XHHW unless specifically indicated otherwise. Insulation shall be suitable for wet and dry locations and be flame retardant.

C. Power wiring of different potentials shall not share the same conduit or raceway system unless specifically indicated otherwise.

D. Install 600V, 90 C RHHN, THWN or XHHW wire where feeding through fluorescent fixture.

E. Provide copper or galvanized fish wire in all empty conduits.

F. Color Coding: *480/277*

A phase	Black
B phase	Red
C phase	Blue (If Required)
Neutral	White
Equipment Grnd.	Green

G. Power conductors may be black with the proper color notation marked at each end of the conductor.

H. Identify exposed ends of all power cables in panels, cabinet, motor control centers, pull boxes, etc., with Scotch #35 color coded color coding.

I. All power, control and instrumentation wiring shall be installed in conduit unless specifically indicated otherwise.

J. Underground direct buried cable shall be polyvinyl chloride, insulated and jacketed, type UF or USE. No splices will be permitted in direct buried runs except as approved by ENGINEER.

K. All control wire shall be copper stranded with no conductor being smaller then #16 AWG with the exception of special cables used for telephone, instrumentation, and data systems.

L. Control wiring shall not be spliced other then at a terminal strip or to leads permanently attached to a control device.

M. All control wiring shall be numbered at each end according to the drawings with a wire number label that will hold up against oil and moisture. The entire wire number shall be clearly printed on only one tag at each end.

N. All power, control and instrumentation wiring shall be installed as indicated below:

1. Wire shall not be installed until all work of any nature that may cause injury to the wire is completed.

2. Mechanical means shall not be used in pulling wires #8 or smaller.

3. Approved wire pulling lubricant shall be used as required to prevent insulation damage and over-stressing of the wire while pulling through conduit.

4. All wiring of panelboards, cabinets, etc., shall be neatly wrapped, taped, or laced into groups to provide a neat and orderly appearance.

2.3 PULL AND JUNCTION BOXES

A. All pull and junction boxes except in wet areas shall be galvanized after fabrication, NEMA 1 gasketed with screw or hinged covers. These boxes shall be manufactured by Hoffman Engineering Company or approved equal.

B. Pull and junction boxes in wet areas shall be FS or FD cast malleable iron. In wet but non-corrosive areas, NEMA 4 boxes may be utilized. All cast fittings shall be provided with threaded hubs. Cast fittings shall be manufactured by Appleton, Crouse-Hinds, Killark, O-Z or approved equal.

C. Boxes shall be sized as indicated on the drawings or as required by the National Electrical Code. Boxes shall also be located as indicated on the drawings or as required for the work involved.

D. Unused openings in boxes and fittings shall be plugged with suitable devices rated for the proper environment.

E. Where several feeders pass through a common pull box, wires shall be tagged to indicate clearly their electrical identification, circuit number, and panel designation.

F. Boxes in dusty or dirty areas such as mechanical and maintenance areas shall have a NEMA 12 or 13 rating.

G. All boxes used with PVC conduit shall be made of PVC and shall have hubs to form watertight joints. They shall have mounting lugs or mounting holes which do not destroy the watertight requirements of the PVC conduit system. PVC boxes shall not be used to support light fixtures or other electrical equipment.

2.4 OUTLET BOXES

A. In general, outlet boxes shall be galvanized, 4-inch, 2 1/8 inches deep, and of the type and size required or specified. Boxes shall be manufactured by Appleton, RACO, Steel City or approved equal.

B. Cast boxes shall be type FS or FD malleable or gray iron, cast body and hubs, gasketed cover and external mounting lugs. Cast boxes shall be manufactured by Appleton, Crouse-Hinds or approved equal.

C. Location of outlets shown on drawings is approximate. CONTRACTOR shall study buildings plans in relation to spaces and equipment surrounding each outlet so that lighting fixtures are symmetrically located according to room layout. When necessary, with approval of the ENGINEER, outlets shall be relocated to avoid interference with mechanical equipment or structural features.

2.5 WIRE CONNECTIONS AND CONNECTING DEVICES

A. In general, Hubbell catalog numbers are indicated. Equivalent Arrow-Hart, Eagle, Leviton, P&S, or Sierra devices are also acceptable. See Symbol Schedule for type of devices required.

B. All duplex receptacles shall be specification grade, NEMA 5-20R, rated 20 amperes and 125 volts. Receptacles shall be constructed of impact resistant nylon. Contacts shall be triple-wipe for minimum heat rise and maximum plug retention. Receptacle color shall be ivory unless specified otherwise. Receptacles shall be a Hubbell 5362-I or equal.

C. All switches shall be specification grade, quiet type, rated 20 amperes and 120-277 volt. Switch shall be constructed using heavy duty thermoset body with sturdy mounting strap. Contacts shall be either silver or silver cadmium oxide to reduce contact erosion. Switch color shall be ivory unless specified otherwise. Switches shall be a Hubbell 1121-I series or equal.

D. All light switches shall be mounted at 48 inches above the finished floor level to the center of the box, unless noted otherwise on the drawings.

E. Plates for utility, mechanical, and storage area to be 1/2-inch raised steel covers.

F. When multiple devices are connected on one circuit such as duplex receptacles, circuit shall not feed through device but shall utilized "pig-tail" type wiring.

G. All splices for wire sizes #16 through #10 AWG shall be made with 3M Co. "Scotchlock" brand electrical spring connectors in accordance with manufacturer's recommendations. Wire #8 and larger: parallel clamp bolted or hydraulically swaged. Split-bolt connectors are not acceptable.

H. All cable and wire connections and terminations shall be made with compression deforming type connectors as manufactured by Burndy Corp., Thomas & Betts Co. or equal.

I. Install separate green ground wire from motor or equipment to J-box beyond greenfield.

J. All underground Low Voltage Splices shall utilize a case splice employing a plastic mold and using epoxy resin equal to that manufactured by Minnesota Mining and Manufacturing Co. "Scotchcast" Kit No. 82-A, or as manufactured by Hyso

Corporation "Hyseal" epoxy splice is acceptable. This means of splicing is the only type acceptable for low voltage wires in direct buried runs.

K. All splices in ground (or neutral) conductors shall be braized. All taps in neutral conductor (for connection to ground rods, etc.) shall be made with cast copper 3-way hinged connector equal to T&B #350005 without cutting ground cable. Ground cable shall be continuous.

2.6 RACEWAY, FIXTURE AND EQUIPMENT SUPPORTS

A. Structural supports for raceway, fixtures, panels, boxes, and all other electrical equipment shall be by CONTRACTOR.

B. In general, supports for fixtures and electrical equipment shall utilize a pre-Engineered strut system including channel, fittings, hardware and accessories for a matched system. Strut system shall be manufactured by Unistrut, B-Line or approved equal.

C. All electrical fixtures, devices, and equipment shall be securely mounted to building structure and shall not depend upon ceiling or wall surfaces for their support. They shall be incapable of being rotated or displaced. Support attachment shall adequately support weight of fixture, device, or equipment plus weight of support attachment.

D. CONTRACTOR shall provide plywood backups and/or strut supports for all electrical raceway, equipment and fixtures as indicated on drawings and as specified.

E. Mounting to prestressed concrete structural members shall be done as recommended by prestressed concrete structural member supplier. In no case shall explosive charges or hammer drills be used on members. All drilling shall be done with carborundum drills or core drills and shall be done in pan section of tee units and in sections of members where no reinforcing steel is present.

F. In general, drawings include various construction, installation and support details. Details are typically provided for special fixture, conduit, equipment supports. Any discrepancy between details shown on the drawings and this specification, shall be brought to the attention of ENGINEER for resolution.

2.7 IDENTIFICATION

A. Install by bolting, engraved plastic laminated nameplates with 1/4-inch high letters on all panelboards, cabinets, motor controls, junction boxes, etc. Engraved plastic laminated nameplates shall be black on white background.

B. Master nameplates for panelboards and motor controls shall indicate: (1) equipment name or identification number, (2) voltage system. Nameplates for individual MCC units of switchboard units shall indicate equipment or feeder name and identification number. All switchboards, panelboards, junction boxes, motor control centers, etc., shall be clearly labeled as to voltage of cable or system terminated therein.

C. Equipment, disconnect switches, motor starters, pushbutton stations, panels, switchgear, special device plates, and similar materials shall be clearly and permanently marked using plastic laminated nameplates.

D. Provide typewritten circuit directories in all panelboards with clear plastic protection shields and mounted in card holders.

PART 3. EXECUTION

3.1 GENERAL

A. Before submitting a bid, examine the Drawings and specifications, visit the site of the work, and inform himself of local conditions, all federal, state and local ordinances, regulations and all other pertinent items which may affect cost, schedule, and completion of this project.

B. Drawings accompanying these specifications are a part of these specifications. Drawings are intended to show general arrangement, design and extent of work and are more or less diagrammatic. Drawings are not intended to show exact locations except where dimensions are shown. Electrical work is shown on plans using standard industry symbols. Before ordering materials or doing work, verify all measurements pertaining thereto and assume responsibility therewith. Any substantial differences existing between Drawings and conditions in the field shall be submitted to ENGINEER for consideration before proceeding with work.

C. All excavating and backfilling as required to complete electrical work to the satisfaction of ENGINEER.

D. Providing all plywood backups and supports for all electrical equipment as indicated on Drawings and as required or specified.

E. Furnishing all materials required to complete the electrical work unless specifically noted otherwise.

F. Providing new, unused equipment and materials, manufactured in accordance with the following standards, where applicable:

Institute of Electrical and Electronic Engineers (IEEE)
American National Standards Institute (ANSI)
National Electrical Manufacturers Association (NEMA)
Insulated Power Cable Engineers Associations (IPCEA)
American Society for Testing and Materials (ASTM)

G. Providing equipment and materials, if of the type tested by the Underwriters Laboratories and/or Electrical Testing Laboratories, Inc., bearing label and using or installing in accordance with instruction included in the listing by the laboratory. Do not modify new equipment in such a way as to nullify the Testing Laboratories label.

H. Maintaining set of prints at the job site upon which all changes and deviations from the original design are to be recorded. Submitting to ENGINEER at the end of the project for preparation of “record drawing”. These Drawings shall indicated as a minimum, all

changes made to the Drawings, changes in circuiting, equipment location, embedded conduit, and all other significant changes and deviations from the original design.

3.2 TEMPORARY ELECTRIC POWER

A. Use existing electrical power of 120 Volt, 1-Phase electrical service for construction purposes. If any CONTRACTOR requires more power or 3-phase power for construction purposes, he shall make his own arrangement.

B. Provide for use by all CONTRACTORs all necessary electrical equipment, including wire, conduit, lamps, sockets, switches, receptacles and any other distribution equipment for temporary construction service.

C. Provide additional temporary lighting as needed, sufficient to enable all trades to complete work and to enable the OWNER or ENGINEER to check all work as it is being done.

D. Furnish extension cords and lamps other than those furnished for general lighting.

3.3 CUTTING AND PATCHING

A. Provide all required cutting and patching to complete the electrical work.

B. All openings are to be sealed as required and to the satisfaction of ENGINEER.

C. All holes in concrete shall be core drilled. No reinforcement bars or structural members shall be cut.

D. No work of any kind shall be covered up before it has been examined and approved by the proper inspection authority.

E. All work, equipment, and materials shall be protected at all times. All conduits and pipe openings shall be closed with caps and plugs during construction.

F. Conduits, etc., passing through walls or roof shall be properly flashed and counterflashed, and caulked to provide a weathertight installation.

G. Neatly replace, patch and finish in kind, adjacent surfaces or features displaced or disturbed in performance of the work. Make joining of new and existing work as inconspicuous as possible. Upon completion of the work, there shall be no discrepancy between new work and existing work. All broken and cut units shall be replaced with new units.

H. Where cutting and patching is required, hire workers skilled in such cutting and patching to do the work.

3.4 SITE WORK

Provide excavation and backfill for all electrical underground work as indicated on the Drawings and as required. Finish grading and final restoration shall be by CONTRACTOR.

3.5 GUARANTEES

Guarantee all materials and workmanship against all defects for a period of 1 year following date of substantial completion and shall replace, at no cost to OWNER, any items found to be defective during that period.

3.6 COORDINATION WITH OTHER TRADES

Provide one (1) power connection to equipment furnished by other Contractors as indicated in electrical Drawings. Equipment which requires additional connections for more power or for control or signal purposes shall have these additional connections provided by Contractor supplying this equipment, except as noted on electrical drawings and specifications. These additional connections shall include, but not be limited to, conduit, wire, signal cables and pneumatic lines and their installation.

END OF SECTION 26 05 00

SECTION 26 51 00

INTERIOR LIGHTING

PART 1. GENERAL

1.1 SCOPE

This section describes the requirements for furnishing and installing lamps and fluorescent fixtures in the water tank building where the air sparge and soil vapor extraction system equipment will be housed.

1.2 DESCRIPTION

1.3 SUBMITTALS

A. The Contractor shall make all submittals in accordance with the requirements of Section 01300.

B. The Contractor shall furnish product data on the lamps and fluorescent fixtures provided.

PART 2. PRODUCTS

2.1 LAMPS

A. Furnish and install all lamps in all fixtures as indicated in the Fixture Schedule as shown on the Drawings and as specified herein. Lamps shall be manufactured by General Electrical (G.E.), Westinghouse, Philips, Sylvania or approved equal.

B. Fluorescent lamps to be COOL WHITE (CW), rated 20,000 hours average for Rapid Start, 12,000 hours average for Instant Start and High Output type lamps. Where energy efficient lamps are indicated, Provide G.E. Watt-Miser type lamps or approved equal.

2.2 FLUORESCENT FIXTURES

A. Furnish and install all fluorescent lighting fixtures, complete with lamps, as indicated in the Fixture Schedule as shown on the Drawings and as specified herein. Type of fixtures to be provided is indicated by "fixture number" on the Drawings. In general, fixtures shall be manufactured by Lithonia, Cooper Industries or approved equal.

B. Provide fixtures and lamps of the size, type and quantity as indicated on the fixture schedule. ENGINEER does not guarantee that fixture catalog numbers are entirely accurate or complete. Verify with fixture supplier that fixtures being supplied do meet all requirements listed.

C. All fluorescent fixtures shall have cold temperature, individually fused 120V thermally-protected, high power factor (HPF) ballasts, ETL-CBM-UL approved with type "A" sound rating except as noted. All fluorescent fixture ballasts shall be Class

"P" to comply with Underwriters Laboratory requirements. Ballasts shall be Advance, Jefferson, G.E., or Universal. Use two (2) lamp ballasts and 4-foot fixtures chassis, except where 8-foot lamps are used.

D. Where cold weather ballasts are indicated in the Fixture Schedule, or as required to meet temperature criteria, ballasts shall be rated -0□F for Rapid Start and -20□F for High Output.

E. Industrial fixtures shall be general purpose, rapid start or high output type with the number of lamps as indicated in the Fixture Schedule. Fixture shall utilize an apertured reflector providing 5 percent uplight. Ballast for industrial fixtures may incorporate a type C sound rating. Fixture frame shall be constructed from die-formed code gauge steel and finished with a five stage, iron phosphate pre-treatment process and polyester enamel finish coat.

F. All plastic fixture lenses and diffusers will be 100 percent virgin acrylic material as specified and manufactured by Rohm and Haas, KSH or approved equal. Fixture lenses which sag shall be replaced. Lenses shall be .80 inches thick minimum not including prism projection (nominal 0.125 inches).

G. Provide proper bushings for wire entrances. All fixture chassis shall be grounded to the conduit system. All fixtures having flexible connections shall have an additional ground wire (green) installed from conduit-connected outlet box to fixture chassis.

PART 3. EXECUTION

Interior lighting will be installed in accordance with the manufacturer's recommendations and with Section 26 05 00 Part 3.

END OF SECTION 26 51 00

SECTION 27 20 00

DATA COMMUNICATIONS

PART 1. GENERAL

1.1 SCOPE

A. Work to be performed under this specification includes all labor, materials and equipment required for the remediation system telemetry as described in these specifications and as shown on the Drawings.

B. All labor, materials and equipment shall also be subject to all applicable sections of Division 00 and Division 01 forming a preface and are a part of these specifications.

1.2 DESCRIPTION

(NOT USED)

1.3 SUBMITTALS

A. The Contractor shall make all submittals under provisions of Section 01 33 00.

B. Shop Drawings

1. Submit three copies of shop drawings to Engineer for review before fabrication and installation. Shop drawings shall include, but not necessarily limited to schematics, wiring diagrams, dimensions, performance data and any other information required by these specifications or as considered necessary by Engineer.

2. Review by Engineer is only for conformance with the design concept of the project and compliance with the specifications and Drawings. Engineer's review does not in any way relieve Contractor, manufacturer or supplier from the responsibility for furnishing materials and performing the work in conformance with the Drawings and specifications and in a safe manner.

3. Prior to submission, carefully check all data for compliance with specifications. He shall also indicate only that material which is applicable by circling catalog numbers, Drawings, etc., to clearly indicate his intent.

4. Shop drawings shall indicate job name, date, and Contractor. Shop drawings shall be submitted in a group for a particular system or category (i.e., lighting fixtures, service equipment, etc.) in brochure form with index or list of equipment. No consideration will be given data not submitted in accordance with the above.

5. The manufacturers indicated in the bid documents shall be used in the base bid. If an "approved equal" is desired to be used, it shall be bid as an alternate to the base bid. Attach to the proposal form, sheet(s) with a brief description of the materials (including source of manufacturer, model

number, basic ratings, etc.) along with an "addition to" or "deduct from" the base bid noted on the attached sheet(s).

1.4 APPLICABLE CODES, STANDARDS, AND WORKMANSHIP

A. All work shall conform to requirements of Illinois State Electrical Code and any local codes and regulations that may apply.

B. All materials shall be new and shall meet requirements of Underwriters Laboratories wherever standards have been set for items in question and shall meet minimum standards of IEEE, ASA, ANSI, NEMA and ASTM.

C. All work shall be installed in accordance with NECA standards of installation.

D. All Permits and inspection fees shall be paid for by Contractor.

E. All work shall conform where applicable to the Williams-Steiger Occupational Safety and Health Act of 1970 (OSHA), Part 1910, "Occupational Safety and Health Standards".

F. Install all equipment and fixtures forming part of the work of this section in complete accordance with the manufacturers' recommendations.

PART 2. PRODUCTS

2.1 TELEMETRY SYSTEM

The telemetry system shall be a SCADA 3000 or Engineer approved equivalent.

PART 3. EXECUTION

3.1 GENERAL

A. The selected telemetry system shall have the capabilities for the following outputs:

1. Pressure – vacuum pressure and air sparge pressure. Vacuum pressure output from each bank of extraction wells and at the blower. Air sparge pressure output from each bank of sparge wells and at the header.

2. Temperature – temperature output from the SVE blower effluent and the air compressor blower effluent.

3. Flowrate – flowrate will be calculated using differential pressure measurements at the blower and compressor effluent. SCFM output will be calculated using a math module or equivalent. The inputs are temperature, differential pressure, and diameter of the conduit. Math module programming will be accessible through a dedicated interface.

4. Run time – counter(s) to keep track of SVE blower and air sparge compressor run time and the run time associated with each air sparge and SVE bank.

5. Alarm Conditions – output will transmit any alarm condition triggered by any control. The output will specify the exact nature of the alarm condition and the time of the occurrence.

B. The selected telemetry system shall have the capabilities to provide the remote operation of the system. Specifically, it shall allow:

1. Remote system start-up and shutdown – the system will allow remote alarm reset and system start-up, including the ability to shut down system remotely.

2. SVE System Vacuum Adjustment – the telemetry system will allow a variable output to an actuated valve which will control vacuum pressures by increasing or decreasing make-up air flow.

3. Air Sparge Flowrate Adjustment – variable output to actuated valve to control air sparge flowrate.

C. The selected telemetry system shall have the capabilities to be expanded and/or reprogrammed, to accommodate any changes in the remediation system.

D. The selected telemetry system shall allow for the remote programming of the control logic.

END OF SECTION 27 20 00

SECTION 31 23 00

EXCAVATION AND FILL

PART 1 - GENERAL

1.1 SCOPE

This section describes the requirements for:

A. Subgrade preparation for the soil excavation in the Outside Container Storage Area (OSA), loading dock area (as necessary) and the trenching for the below grade soil vapor extraction (SVE) and air sparge (AS) piping;

B. Subgrade preparation for trenching for the below grade soil vapor extraction (SVE) and air sparge (AS) piping;

C. Excavation of soil in the OSA;

D. Trenching for the below grade SVE and AS piping;

E. Backfilling and compaction of excavation and trenches; and

F. Construction of clay cap in the OSA.

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTALS

A. The Contractor shall make all submittals in accordance with the requirements of Section 01 33 00.

B. Contractor shall submit for review the names of the source for imported material suppliers, supporting laboratory tests, and certifications showing that the imported materials meet the minimum requirements of the Contract Documents.

C. The Contractor shall submit to the Engineer all quality control reports and all other testing report forms which support the testing requirements within one week of receipt or completion of such tests.

D. The Contractor shall provide new certification and compliance tests when the source or stockpile from which materials are obtained is changed. The Contractor shall include quality control testing and inspection in the Contract Price, complete; no additional compensation shall be made for such testing.

E. As requested by the Engineer for quality assurance testing, the Contractor shall furnish samples from material available on-site or from the Contractor's source supplier.

1.4 APPLICABLE STANDARDS

Pertinent provisions of the publications and standards listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A. Code of Federal Regulations (CFR):

1. 29 CFR Part 1926 Occupational Safety and Health Standards – Excavation

2. 26 CFR Part 1910 Worker Exposure Limits- Toxic and Hazardous Substances, Noise, and Emergency Response.

3. 40 CFR Part 241 Guideline for the Land Disposal of Solid Waste

4. 40 CFR Part 261 Identification and Listing of Hazardous Waste

5 40 CFR Part 262 Standards for Hazardous Waste Generators

6. 40 CFR Part 263 Standards for Hazardous Waste Transporters

7. 40 CFR Part 264 Standards for Owners and Operators of Hazardous Waste Treatment Storage and Disposal Facilities

8. 40 CFR Part 265 Interim Status Standards for Owners and Operators of Hazardous Waste Treatment Storage and Disposal Facilities

9. 40 CFR Part 268 Land Disposal Restrictions- RCRA

10. 40 CFR Part 280 Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks

11. 49 CFR Parts 107, 171.1-171.5 Department of Transportation rules for Transportation of Hazardous Materials

B. Illinois Environmental Protection Agency (IEPA)

Section 21 (415 ILCS5/21) Pollution control Board (Title 35)

C. OSWER Directive 9355

D. ASTM Standards

1. ASTM C 117 Materials Finer than No. 200 (0.075 mm) Sieve by Washing

2. ASTM C 136 Method for Sieve Analysis of Fine and Coarse Aggregates.

3. ASTM D 422 Method for Particle-Size Analysis of Soils.

4. ASTM D 698 Moisture Density Relations of Soils and Soil-Aggregate Mixtures Using a 5.5 pound (2.49 kg) hammer and a 12-inch (304.8 mm) drop.

5. ASTM D 2434 Test Method for Permeability of Granular Soils.

6. ASTM D 2922 Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

7. ASTM D 3017 Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

1.5 CONTRACTOR REQUIREMENTS

A. Contractor shall be responsible for the Health and Safety of all workers in proximity of the excavation.

B. Contractor shall have a trained competent person on site to assess and inspect the excavation on the following schedule, at a minimum:

1. Daily and before the start of each shift;

2. As dictated by the working being performed;

3. After every precipitation event;

4. After other events that could increase the hazards such as windstorms, thaw, earthquake, dramatic change in weather, etc;

5. When fissures, tension cracks, sloughing, undercutting, water seepage, bulging at the bottom, or other similar conditions occur; and/or,

6. When there is any indication of change or movement in adjacent structures.

C. Contractor shall give advance notice of at least 24 hours to the Engineer when ready for compaction or subgrade testing and inspection.

D. Pre-construction material quality evaluations shall be performed by the Contractor. The Engineer shall be provided the opportunity to review all of the Contractor's pre-construction tests results prior to incorporation in the respective cover system components fill. Testing type and frequency for pre-construction material quality evaluation are summarized in the CQAPP.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Compaction equipment shall be suitable for the soils to be compacted so as to consistently attain the required soil densities throughout the compacted soil mass.

B. At all times, Contractor shall maintain in satisfactory working condition all equipment, tools and machines used in completing the Work.

C. The contractor shall not use compaction equipment employing free-fall weights.

D. The Contractor shall not use "whackers", "jumping jacks", "ponding", or "jetting" for soil compaction.

E. Equipment used for proof rolling the top surface of the last lift of the consolidated fill shall consist of a single drum smooth roller with drum drive, such as the Caterpillar model CS-553, the Hyster model C850A, or equivalent, as approved by the Engineer.

2.2 MATERIALS

A. Pipe Bedding Material: The contractor shall provide clean sand as pipe bedding for below grade SVE/AS piping.

B. Pipe Trenching Backfill Material: The contractor shall provide clean fill free of organic matter, debris, snow, and ice.

C. OSA Excavation Backfill: The contractor shall provide clean fill free of organic matter, debris, snow, and ice.

D. OSA Clay Cap: The contractor shall provide clean clay soil as cap material for the OSA excavation.

D. Tracer Wire: The contractor shall provide 12 AWG polyethylene insulated copper tracer wire or ENGINEER approved equal to span the length of the pipe trenches.

E. Caution Tape: The contractor shall provide caution tape to span the length of the pipe trenches.

F. Vegetative Fill Material (Top Soil): Consists of a clean fill soil material to be used as a vegetative root zone meeting the following requirements:

	Minimum	Maximum
Material passing #10 sieve	90%	NA
Clay	5%	30%
Silt	10%	70%
Sand & Gravel	20%	70%
Organic Matter	4%	20%
pH	6.1	7.5
Extractable Phosphorous	30 lbs/acre	
Exchangeable Potassium	150 lbs/acre	

PART 3 - EXECUTION

3.1 GENERAL

The paragraphs of this article apply to all fill materials and earthwork operations.

A. The location of all existing utility mains and lateral lines including storm drain, sanitary sewer, water, gas, underground electrical and communication conduits crossing the trench excavation shall be verified by the Contractor and, if necessary, exposed ahead of any trench operations. Any existing utility that is cut or damaged during the trenching operation shall be called to the attention of the Engineer and repaired at the Contractor's expense.

B. Work done in inclement weather shall be at the Contractor's risk and expense. Replace and rework any material that becomes unsuitable or unstable as the result of work during inclement weather. No additional payment shall be made for replacement and reworking of materials due to construction activities during inclement weather.

C. Groundwater encountered in the trenches or OSA excavation that interferes with safe working conditions in the trench or excavation shall be removed with a trash or sump pump, containerized, and properly disposed of offsite.

D. Surface water or rain water encountered in the trenches or OSA excavation that interferes with safe working conditions in the trench or excavation shall be removed with a trash or sump pump and must be properly disposed.

D. Verify that areas to be filled are free of roots, stumps, debris, ice, or water, and ground surfaces are not frozen.

E. Place fill material layers only after the previous layer has been accepted by the Engineer. Any damage to the previous layer or deterioration subsequent to acceptance shall be repaired by the Contractor to the satisfaction of the Engineer at the expense of the Contractor.

F. Fill and compact all holes and other depressions prior to placement of new fill.

G. Fill areas to contours and elevations shown on the Drawings.

H. Maintain surface of cover components as shown on the Drawings to maintain a minimum grade for drainage.

I. Transport borrow materials over land or roads identified in the Contractor's haul plan.

J. Perform access road maintenance including dust control by application of water as needed or by other suitable means approved by the Engineer. Road maintenance shall maintain construction access roads in a safe and sound condition.

K. Obey all applicable laws where borrow materials are transported along public roads, including but not limited to, laws relating to vehicle speed, vehicle weight, covering of loads and proper maintenance of the public road surfaces (i.e. dust).

L. Generally, trenches shall not be left open at the end of a work day. Those that must be left open shall be confirmed by the engineer and properly barricaded in accordance with the requirements of Section 01 56 00.

3.2 OSA EXCAVATION

A. Excavation at the OSA shall occur as described in the Final Outside Container Storage Area Source Material Mass Reduction Work Plan, Design Document, and Contract Drawings.

B. Excavation rates will be controlled and limited by the Health and Safety considerations and property boundaries. The excavation may be limited.

C. Quality Assurance sampling and analysis will take place as described in the Construction Quality Assurance Project Plan (CQAPP) and the Final Outside Container Storage Area Source Material Mass Reduction Work Plan, Design Document, and Contract Drawings.

3.3 STRUCTURE AND TRENCH EXCAVATION

Structure or trench excavations shall be completed to the specified elevations and to sufficient length and width to include allowance for forms, bracing and supports, and compaction of backfill, as necessary, before any concrete or earth fill is placed within the limits of the excavation.

3.4 OVER EXCAVATION

Excavation in earth beyond the specified lines and grades shall be corrected by filling the resulting voids with approved compacted earth fill as specified herein or as directed by the Engineer, except that, if the earth is to become the subgrade for rock fill, sand or gravel bedding, or drain fill, the voids may be filled with material conforming to the specifications for the rock fill, bedding, or drain layers. All fill necessary to be placed due to over excavation shall be the responsibility of the Contractor.

3.5 PIPE BEDDING

A. The pipe bedding material shall have a minimum thickness of six inches below the bottom of the pipe(s). After bedding has been placed, the pipe(s) shall be laid true to the specified line and grade using pipe bedding material. The material shall extend a minimum of (12) inches above the top of the pipe(s) or as indicated in the design drawings.

B. The Contractor shall place the bedding surface for the pipe to provide a firm foundation of uniform density throughout the entire length of the pipe. Place the pipe carefully in the foundation bedding accurately shaped and rounded to the lower curbed portion of the pipe bottom for the entire length of pipe. When necessary, the foundation bedding shall be further tamped to fill existing voids.

3.6 BACKFILL

A. The Contractor shall take all necessary precautions to protect the pipe from any damage, movement, or shifting. Contractor quality control testing for density shall be made as required to assure the Contractor of conformance to the specified compaction criteria.

B. The Contractor shall place pipe bedding material below and adjacent to the pipe in uniform and loose lifts no more than 8 inches thick up to a minimum of 12 inches over the top of the pipe(s). The pipe bedding material shall be brought up concurrently on either side of the pipe(s) or its encasement so as not to displace the pipe from the established alignment. Furthermore, the bedding material shall be placed so as to provide a firm and uniform foundation, void of any holes or depressions, for the entire length of the pipe. Wherever such holes or depressions are observed, the bedding material shall be further tamped until all such voids are filled.

C. The Contractor shall compact pipe bedding material placed within 12 inches of the pipe by hand tamping equipment or vibratory compaction equipment only. General backfilling with pipe bedding material, select backfill, and/or topsoil 12 inches above the pipe(s) shall occur by spreading fill in uniform and loose lifts no more than 8 inches thick to the lines, grades, and elevations as shown on the Contract Drawings.

3.7 OSA EXCAVATION BACKFILL AND CAP PLACEMENT

A. Backfill shall be placed in twelve inch lifts to elevations determined by the Engineer after the OSA soils are excavated.

B. The Backfill soil shall be compacted to a minimum of 85% of the standard proctor density determined for the different soil types or as specified by the engineer.

C. The clay cap will be placed in twelve inch lifts at a minimum of the top three feet of the excavation.

C. The density and moisture content of the consolidated soil will be determined at the rate and by the methods set forth in the CQAPP manual.

3.8 DRAINAGE & VEGETATIVE SOIL LAYER (TOP SOIL)

A. The work shall consist of furnishing and placing the Drainage and Vegetative Soil Layer materials as shown on the Drawings and specified herein.

B. The Drainage & Vegetative Soil Layer material shall be placed over the OSA Excavation clay cap and the trench surfaces. The material shall be placed in a manner to ensure the continuity and integrity of all zones.

C. Heavy construction traffic shall not be allowed to cross over the Vegetative Soil Layer (except for the equipment used for spreading the layer) unless the thickness is a minimum of 18 inches.

D. Any damage to the Drainage & Vegetative Soil Layer occurring as a result of

placement shall be repaired before the Vegetative Soil Layer placement is continued. The expense of the repair shall be the responsibility of the Contractor.

E. The Vegetative Soil Layer shall be made continuous over the entire OSA clay cap as shown on the Drawings.

F. The test requirements for the Vegetative Soil include:

1. ASTM D 422-63 - Grain Size Distribution: 1 test

2. USDA Standard Testing of Soil Nutrients including: pH, extractable nitrogen, extractable phosphorous and extractable potassium.

3.9 OSA CAP CONSTRUCTION QUALITY CONTROL

A. Inspection during construction shall consist of (1) visual inspection of the work, and (2) field and laboratory tests. All field and laboratory tests shall be conducted on samples taken from material during the course of the work.

B. Contractor will inform the Engineer when, in his opinion, the results of mechanical compactive effort indicate that the specified percent compaction has been achieved.

C. Contractor shall remove Work, replace, and retest at no additional cost the where testing indicates Work not meeting the specified requirements.

D. Contractor shall be responsible for surveying the approximate location and elevation of each test.

E. Field Surveys shall be the responsibility of the Contractor and performed by a qualified land surveyor to verify proper total layer thicknesses and construction at the proper locations and elevations.

Survey data shall be collected at any critical location as designated by the Engineer, at points a maximum of 50 feet apart:

1. Top of OSA backfill layer;

2. Top of OSA clay cap layer;

3. Top of OSA vegetative soil layer;

Final surveys will be performed by the Contractor's Surveyor to verify elevations of cover component items.

F. Visual observations shall be performed for all designed construction components. In addition, special attention shall be given to the character and condition of the placement surface; water content, density, and other pertinent physical properties of the compacted soil; loose and compacted thicknesses and elevations; lift scarification and bonding procedures; effects of equipment on the construction surface; and the number of passes required to compact each lift.

G. Additional testing shall be used or frequency of testing may be increased at the discretion of the Engineer when visual observations indicate a concern.

END OF SECTION 31 23 00

SECTION 31 80 00

WELL ABANDONMENT

PART 1 - GENERAL

1.1 SCOPE

This section describes the work necessary to abandon the existing wells in the OSA prior to the excavation of the soils.

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTALS

A. The Contractor shall make all submittals in accordance with the requirements of Section 01 33 00.

B. Abandonment logs shall be submitted to Engineer within five (5) days following the conclusion of each item.

1.4 APPLICABLE STANDARDS

A. Illinois Water Well Construction Code Section 920.120.

B. Illinois Environmental Protection Agency: Monitor Well Plugging and Abandonment Procedures.

PART 2 - PRODUCTS

2.1 CEMENT/BENTONITE GROUT

The cement/bentonite grout shall be composed of and be mixed in the following proportions: 8 gallons of potable water, one sack (94 pounds) of Type I or Type II (ASTM C-150) Class A Portland cement, and 6% (2 pounds) of powdered sodium bentonite or Aqua Gel. The use of sodium bentonite in the grout will reduce shrinkage as the cement sets.

PART 3 - EXECUTION

3.1 WELL ABANDONMENT

A. If practical, the well casing shall be pulled from the ground while sealing with grout. If pulling the casing is not feasible, the casing shall be cut off at least 2 feet below ground surface and the borehole will be filled with grout.

B. All grouting and sealing of the wells shall be performed in accordance with all applicable standards listed in Part 1.4 of this specification. Abandonment will be done only by a Illinois Licensed Water Well Contractor and in the presence of the Engineer. The Contractor shall tremie the grout into the bottom of the hole with the tremie pipe no closer than 3-feet from the bottom of the well. The Contractor shall

take full responsibility for cementing operation, including volumes to be used and insuring that the hole and/or well is properly abandoned

C. Unless otherwise specified, all materials removed from the boreholes shall be containerized on site. These containerized materials shall be stockpiled on-site for disposal by site owner at a later time.

D. Well abandonment log

An accurate log of the well abandonment details shall be maintained. At minimum, the log shall include total depth of the abandoned well, depth or location of any lost grout, diameter of well bore, volumes of cement grout (gallons, number of bags and type) used to fill the borehole, the depth for all stages of cement grouting operations, and other pertinent data requested by the Engineer.

END OF SECTION 31 80 00

SECTION 31 81 00

WELL INSTALLATION

PART 1 - GENERAL

1.1 SCOPE

This section describes the work necessary to install air sparge (AS) injection wells and soil vapor extraction (SVE) wells in the western portion of the South Alley.

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTALS

A. The Contractor shall make all submittals in accordance with the requirements of Section 01 33 00.

B. Boring and well completion logs shall be submitted to Engineer within five (5) days following the conclusion of each item.

1.4 APPLICABLE STANDARDS

A. Illinois Water Well Construction Code Section 920.120.

B. Illinois Environmental Protection Agency: Well Installation Procedures.

C. Unified Soil Classification System; American Society for Testing and Materials (ASTM) D-2488-00 “Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)”

PART 2 - PRODUCTS

2.1 WELL SCREEN/RISER

The injection wells will be constructed with 1.5 inch diameter, 0.010 slot 304 stainless steel (SS) well screen, 304 SS riser, and schedule 40 polyvinyl chloride (PVC) riser above the water table.

The extraction wells will be constructed of 4 inch diameter, 0.010 slot schedule 40 PVC well screen connected to 4 inch diameter PVC riser.

2.2 FILTER PACK/ SEAL

The filter pack in both injection and extraction wells will be red flint #3545 (or equivalent). A sugar sand filter collar will be placed above the filter pack. The annular space of the wells will be sealed above the filter collar using bentonite chips (or pellets) hydrated in place with potable water or the water in the formation.

2.3 CEMENT/BENTONITE GROUT

The cement/bentonite grout will be composed of and mixed in the following proportions: 8 gallons of potable water, one sack (94 pounds) of Type I or Type II (ASTM C-150) Class A Portland cement, and 6% (2 pounds) of powdered sodium bentonite or Aqua Gel.

PART 3 - EXECUTION

3.1 WELL INSTALLATION

A. The boreholes will be drilled using 8 inch diameter (or greater) hollow stem augers or sonic drilling methods.

B. The depth to groundwater is approximately 33 feet bgs [elevation 695 feet above mean sea level (MSL)]. For the injection wells, the top of the screened interval will be set at a depth of 17 feet below the groundwater level, or approximately 50 bgs. The injection wells will have a two foot screened interval, for a total well depth of approximately 52 feet bgs. The SS well screen and riser will be installed in the groundwater table and the PVC riser will be installed above the groundwater table. Actual depths will be determined in the field.

The extraction wells will be set at a depth approximately three feet above the typical groundwater level of 33 feet bgs (a total depth of approximately 30 feet bgs). The screen will be approximately 10 feet in length; however the exact depth and screened interval will be determined during installation.

In both injection and extraction wells, a filter pack of red flint #3545 (or equivalent) will be installed in the annular space around the well and extend 12 inches above the screen. A sugar sand filter collar will extend above the filter pack approximately 12 inches. The annular space above the filter pack will be sealed using bentonite chips (or pellets) hydrated in place with potable water or water from the formation. The bentonite seal will extend three feet above the sugar sand filter collar.

The remainder of the annular space around the well will be filled with cement/bentonite grout to a depth of approximately 42 inches bgs.

At a minimum, the interval of the screened section of the well will be continuously sampled using split spoon or direct push sampling methods. The soils will be logged in the field using the unified soil classification system description as determined by the Visual-Manual Procedure.

C. Unless otherwise specified, all materials removed from the boreholes shall be containerized on site. These containerized materials shall be stockpiled on-site for disposal by site owner at a later time.

D. Well construction log:

An accurate well construction log of the well installation details shall be maintained. At minimum, the log shall include the location of the well, total depth, diameter of

borehole and well, length of screened interval and riser(s), volumes of filter pack, bentonite seal, and cement grout (gallons, number of bags and type) used to fill the annular space, the depth for all stages of filter pack, sand filter collar, bentonite seal, cement grout, and other pertinent data requested by the Engineer.

END OF SECTION 31 81 00

SECTION 32 11 00

BASE COURSES

PART 1 - GENERAL

1.1 SCOPE

This work shall consist of the following:

A. Preparing the completed or existing earthwork as an unimproved subgrade prior to constructing asphalt pavement structures, shoulders, or appurtenances.

B. Furnishing, placing, and compacting granular material on the prepared subgrade.

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTALS

A. The Contractor shall make all submittals in accordance with the requirements of Section 01 33 00.

B. Contractor shall submit for review the names of the source for imported material suppliers and certifications showing that the imported materials meet the minimum requirements of the Contract Documents.

C. The Contractor shall submit to the Engineer all quality control reports and all other testing report forms which support the testing requirements within one week of receipt or completion of such tests.

D. As requested by the Engineer for quality assurance testing, the Contractor shall furnish samples from material available on-site or from the Contractor's source supplier.

1.4 APPLICABLE STANDARDS

All work performed under this specification will be in accordance with the Illinois Department of Transportation (IDOT) Standard Specification for Road and Bridge Construction (2007).

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Contractor shall use the following equipment in accordance with the IDOT Division 1100 Specification for Road and Bridge Construction:

1. Steel Wheel Rollers

2. Pneumatic-Tired Rollers

3. Vibratory Machine

4. Subgrade Planer

5. Subgrade Machine

B. Compaction equipment shall be suitable for the soils to be compacted so as to consistently attain the required soil densities throughout the compacted soil mass.

C. At all times, Contractor shall maintain in satisfactory working condition all equipment, tools and machines used in completing the Work.

2.2 MATERIALS

Course aggregate supplied by the Contractor will be in accordance with the IDOT Specification for Road and Bridge Construction, Section 1004.

PART 3 - EXECUTION

3.1 SUBGRADE PREPARATION

A. The subgrade shall have a minimum dry density of 95 percent of the standard laboratory dry density and a minimum immediate bearing value (IBV) of 8.0, tested per the IDOT Specification.

B. The subgrade will be approved by the Engineer before construction of the pavement structure, shoulders, or appurtenances is started.

C. The subgrade shall be compacted by rolling with a steel wheel or pneumatic-tired roller. The rolling shall extend at least 12 in. (300 mm) beyond each edge of the proposed base course.

D. The subgrade shall be kept drained during the construction of the pavement structure. If earth berms are deposited along the edge of the subgrade, provision shall be made for surface drainage by cutting lateral ditches through the berms.

3.2 AGGREGATE BASE COURSE

A. The granular material shall be placed and compacted as specified for the particular type of granular subbase. If any earth is worked into the granular material during the compacting or finishing operations, all granular material within the affected area shall be removed and replaced with new granular material. The Engineer may restrict hauling over the completed or partially completed work after inclement weather or at any time when the earth subgrade is soft and there is a tendency for the earth to work into the granular material.

B. The granular material shall be placed and compacted at least three days prior to the placement of pavement or base course.

C. If the moisture content is insufficient to maintain satisfactory compaction or to prevent segregation or raveling when hauling is permitted over the granular material, water shall be added as directed by the Engineer.

D. The granular material shall be uniform in gradation. Before the material is deposited on the roadway, it shall contain the amount of moisture required for compaction. The amount of moisture required shall be that determined by the Engineer for the material and the compaction methods being used. The water and granular material shall be mixed through a controlled aggregate mixing system. The system shall consist of a mechanical mixing device and aggregate and water measuring devices meeting the approval of the Engineer. Wetting the aggregate by jetting in cars, bins, stockpiles, or trucks will not be permitted. Moisture shall be added to the material during compaction only when it is necessary to increase the percentage of moisture to obtain satisfactory compaction.

E. The subbase shall be constructed in lifts not more than 4 in. (100 mm) thick when compacted, except that if tests indicate that the desired results are being obtained, the compacted thickness of any lift may be increased to a maximum of 8 in. (200 mm).

F. The granular material shall be deposited with a mechanical spreader or spreader box of a type approved by the Engineer, in a manner that shall not cause segregation and that shall require minimum blading or manipulation. The equipment and the method used shall be approved by the Engineer.

G. Each lift shall be compacted immediately after placing. The granular material shall be compacted to not less than 95 percent of the standard laboratory density.

H. The compacted subbase shall be placed above the plan elevation and the excess trimmed or cut with the subgrade machine. The Contractor shall determine the amount of excess subbase material necessary to meet this requirement.

I. After the subbase has been brought to its true shape and correct elevation, the surface shall be wetted and rolled as directed by the Engineer with a steel wheel roller. The surface of the subbase shall then be tested for crown and elevation.

END OF SECTION 32 11 00

SECTION 32 12 00

FLEXIBLE PAVING

PART 1 - GENERAL

1.1 SCOPE

This work shall consist of constructing hot-mix asphalt (HMA) binder and/or surface course on a prepared base.

1.3 DESCRIPTION

(Not Used)

1.3 SUBMITTALS

A. The Contractor shall make all submittals in accordance with the requirements of Section 01300.

B. Contractor shall submit for review the names of the source for imported material suppliers and certifications showing that the imported materials meet the minimum requirements of the Contract Documents.

C. The Contractor shall submit to the Engineer all quality control reports and all other testing report forms which support the testing requirements within one week of receipt or completion of such tests.

D. As requested by the Engineer for quality assurance testing, the Contractor shall furnish samples from material available on-site or from the Contractor's source supplier.

1.4 APPLICABLE STANDARDS

All work performed under this specification will be in accordance with the Illinois Department of Transportation (IDOT) Standard Specification for Road and Bridge Construction (2007).

PART 2 - PRODUCTS

2.3 EQUIPMENT

A. Contractor shall use the following equipment in accordance with the IDOT Division 1100 Specification for Road and Bridge Construction:

1. Self-Propelled Pneumatic-Tired Roller

2. Three-Wheel Rollers

3. Tandem Rollers

4. Vibratory Roller

5. Spreading and Finishing Machine

6. Pressure Distributor

7. Trench Roller

8. Pavement Surface Test Equipment

B. Compaction equipment shall be suitable for the soils to be compacted so as to consistently attain the required soil densities throughout the compacted soil mass.

C. At all times, Contractor shall maintain in satisfactory working condition all equipment, tools and machines used in completing the Work.

2.4 MATERIALS

A. Materials supplied by the Contractor for this work will be in accordance with the IDOT Specification for Road and Bridge Construction, Section 1030, 1032, and 1003.03. Materials are to include:

1. Hot-mix asphalt;

2. Bituminous Materials; and,

3. Fine Aggregate.

B. The bituminous material used for prime coat shall be one of the types listed in the following table. When more than one grade is shown for a particular type, the Engineer reserves the right to specify the grade which shall be used.

Type of Construction	Bituminous Materials
Prime (tack) on Brick Concrete or HMA Bases	SS-1, SS-1 h, CSS-1, CSS-1 h HFE 90, RC-70, SS-1hP, CSS-1hP
Prime on Aggregate Bases	MC-30

PART 3 - EXECUTION

3.1 HOT MIX ASPHALT PLACEMENT

A. Hot mix asphalt (HMA) shall be placed on a clean, dry base and when weather conditions are suitable. The leveling binder and binder courses shall be placed only when the temperature in the shade is at least 40 ºF (5 ºC) and the forecast is for rising temperatures. The surface course shall be placed only when the air

temperature in the shade is at least 45 ºF (8 ºC) and the forecast is for rising temperatures.

B. The HMA shall be delivered at a temperature of 250 to 350 ºF (120 to 175 ˚C).

C. Intermingling of different mixture compositions at any one paver will not be permitted.

D. HMA shall be placed and compacted during daylight, unless artificial light satisfactory to the Engineer is provided.

E. In the event of sudden rain, the loading of trucks at the plant or from storage bins shall immediately stop. Material in transit will be permitted to be laid at the Contractor's risk providing the pavement is free of standing water and the proper temperature of the HMA is maintained. Approval to unload the trucks in transit shall in no way relax the requirements for quality, density, or smoothness of the HMA being placed.

F. Lift Thickness. The minimum compacted lift thickness for constructing HMA binder and surface courses shall be as follows.

MINIMUM COMPACTED LIFT THICKNESS	
Mixture Composition	Thickness, in. (mm)
IL-9.5, IL-9.5L	1 1/4 (32)
IL-12.5	1 1/2 (38)
IL-19.0, IL-19.0L	2 1/4 (57)
IL-25.0	3 (75)

G. Spreading and Finishing. The HMA shall be placed with a spreading and finishing machine to the typical section and grade shown on the plans or as established by the Engineer. On areas where irregularities, inaccessibility, or unavoidable objects make the use of mechanical spreading and finishing impractical, as determined by the Engineer, the HMA may be spread, raked, and luted by hand.

H. The operating speed of the paver shall not exceed that speed which is necessary to produce a uniformly spread and struck off mat having a smooth texture without tearing or segregation. The paver speed shall be mated with the required roller speed and shall not exceed that which coincides with the average rate of delivery of HMA to the paver to provide, as nearly as possible, continuous operation of the paver. In no case shall the speed of the paver exceed 50 ft (15 m) per minute.

I. A stringline shall be used as a guide for the finishing machine in order to maintain a uniform edge alignment; if any other method is proposed, it shall meet the approval of the Engineer before being used. Irregularities in the alignment of the outside edges and along the longitudinal joint shall be corrected by adding or removing HMA before the edges are rolled. Excess HMA deposited on the existing base, binder course, or surface course outside the limits of the lane being laid shall be removed immediately and disposed of as directed by the Engineer.

J. Segregation Control. Paving operations shall be conducted in a manner to prevent medium or high segregation.

K. Plant operations, hauling of the mix, paver operations, and the compacted mat shall be continually monitored for segregation.

L. Construction Joints. The HMA shall be placed away from transverse construction joints.

M. Any HMA lift shall be complete before construction of the subsequent lift. The longitudinal joint in all lifts shall be at the centerline of the pavement.

END OF SECTION 32 12 00

SECTION 32 90 00

PLANTING

PART 1 - GENERAL

1.1 SCOPE

A. This section describes the requirements for the furnishing of all equipment, materials, and labor to complete the soil preparation and seeding of previous work and general Site cleanup for pipe trenching and the OSA excavation.

B. Establish vegetation in areas where construction excavations and cuts are exposed and seed areas disturbed by construction to match existing undisturbed areas, to provide erosion protection and to enhance the aesthetic quality of the project area.

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTALS

A. The Contractor shall make all submittals in accordance with the requirements of Section 01 33 00.

B. Contractor shall submit for review the names of the source for imported material suppliers showing that the imported materials meet the minimum requirements of the Contract Documents.

1.4 APPLICABLE STANDARDS

(Not Used)

PART 2 - PRODUCTS

2.1 MATERIALS

A. 12-12-12 fertilizer- 12% nitrogen, 12% phosphate, 12% soluble potash, and 15% sulfur;

B. Seed in the following proportions: 30% Kentucky Bluegrass (*Poa pratensis*), 30% Creeping Red Fescue (*Festuca rubra*), 20% Annual Ryegrass (*Loium multi florum*) and 20% Perenial Ryegrass; and,

C. Mulching material comprised of straw, hay or wood fiber that is relatively free of weed seed or other materials that could inhibit plant growth.

2.2 EQUIPMENT

A. The Contractor shall provide equipment necessary to complete the soil preparation and seeding.

B. At all times, Contractor shall maintain in satisfactory working condition all equipment, tools and machines used in completing the Work.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

Seed all areas where existing natural vegetation has been destroyed or removed as a result of the Work to match existing adjacent vegetation. Provide protection for seeded areas during the establishment phases of the planted vegetation. Repair and replant all seeded areas damaged during the Work at Contractor's expense.

3.2 REVEGETATION

A. Preparation: The preparation of the ground immediately preceding seeding shall include all cultivation, scarification and all other measures necessary to accommodate the materials used to re-vegetate. Completely till the soil to a depth of 4 to 6 inches where:

1. Soil compaction is severe;

2. Surface drainage is inadequate; or

3. The soil is to be amended.

B. The top soil should slope away from buildings, and the area should be allowed to settle through two or more rains before planting. Low spots should be filled with additional soil. All building debris, large rock, and rotting wood should be removed from the site. A minimum of 6 to 8 inches of topsoil is required.

C. 12-12-12 fertilizer will be applied at a rate of 0.1 kg/m^2 prior to sowing.

D. Seed will be sown evenly at a rate of 0.025 kg/m^2 and shall be raked in immediately after sowing.

E. Mulching material will be applied within 48 hours of sowing at a rate of 2 ton/acre.

F. Seeding and Fertilizing: Seed shall be applied in a way that promotes satisfactory growth in minimum amount of time. If the growth of the vegetation is unsatisfactory after reasonable time has passed, the Contractor shall return to reapply any necessary material to promote the growth which was initially intended. All such subsequent work shall be performed to the satisfaction of the Owner and ENGINEER and shall be done at the Contractor's expense.

END OF SECTION 32 90 00

SECTION 40 05 00

COMMON WORK RESULTS FOR PROCESS PIPING

PART 1 - GENERAL

1.1 SCOPE

A. This section describes the Work necessary to furnish, install, and complete, the piping systems specified herein, and as shown on the Contract Drawings.

B. Like items of materials specified herein shall be products of one manufacturer.

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTALS

A. Contractor shall make submittals in accordance with the requirements of Section 01 33 00. The following information will be provided:

1. Shop Drawings: Vendor and catalog information on all system components such as pipe, fittings, valves, hangers, guides, expansion joints, etc. for materials used in the Work.

2. Submit manufacturer's certificates of conformance with applicable Standards and Codes.

1.4 APPLICABLE STANDARDS

A. American Society for Testing Materials (ASTM).

1. ASTM D-1785, PVC Plastic Pipe, Schedule 40, 80, and 120.

2. ASTM D-2241, PVC Plastic Pipe (SDR-PR).

3. ASTM D-2466, PVC Plastic Pipe Fittings, Schedule 40.

4. ASTM D-2239, PE Plastic Pipe SDR

5. ASTM D-2447, PE Plastic Pipe, Schedules 40 and 80, SDR

6. ASTM D-2564, Solvent Cements for PVC Plastic Pipe and Fittings.

7. ASTM D-2657, Heat Jointing of Thermoplastic Pipe and Fittings.

8. ASTM A-53, Welded and Seamless Steel Pipe

B. Uniform Mechanical Code (UMC).

C. Uniform Plumbing Code (UPC).

E. Comply with all referenced and applicable commercial standards, specifications, codes, and rules, including current addenda and errata.

F. Where Contract Drawings or Technical Specifications do not conform with minimum applicable codes or with utility agencies rules and regulations, the codes, rules, or regulations shall govern as directed by the Engineer.

PART 2 - PRODUCTS

2.1 PIPE

A. Air Sparge and Soil Vapor Extraction Subgrade Conveyance Piping - High Density Polyethylene (HDPE) Pipe

1. Piping shall be high density polyethylene PE3408 in accordance with ASTM D-3350, cell classification of PE 345434C, or Engineer approved equal.

2. Conveyance pipe and fittings shall have a minimum wall thickness equal to SDR 11, and shall have a minimum working pressure rating of 160 psig.

3. All fittings shall be factory manufactured.

B. Soil Vapor Extraction Abovegrade Manifold and Process Piping - Schedule 40 Polyvinyl Chloride (PVC) Pipe.

1. SVE piping shall be polyvinyl chloride (PVC) type 1, grade 1, Schedule 40, in accordance with ASTM D-1785 and D-2467.

2. All fittings shall be factory manufactured and be in accordance with D-2467.

C. Air Sparge Compressed Air Supply Manifold Abovegrade Conveyance Piping – Schedule 40 Galvanized Steel.

1. Air sparge piping shall be Schedule 40 galvanized steel pipe in accordance with ASTM A53.

2. All fittings shall be factory manufactured and be in accordance with A-53

2.2 VALVES

A. Gate valves shall be Schedule 40 **Brass**, flanged design with viton seals and have a minimum of 175 psi pressure rating at 70^{o} F and be rated for million cycle design. Valves will be supplied by Hayward or Engineer approved equivalent.

B. Butterfly valves shall be Schedule 40 PVC, flanged design with viton seals and have a minimum of 175 psi rating at 70^{o}F and be rated for million cycle design. Valves will be supplied by Hayward or Engineered approved equivalent.

C. Ball valves shall be Schedule 40 PVC, true union design with viton seals and have a minimum of 175 psi rating at 70^{o}F and be rated for million cycle design. Valves will be supplied by Hayward or Engineered approved equivalent.

D. Spring and Ball Check valves shall be Schedule 40 PVC, true union design with viton seals and have a minimum of 175 psi rating at 70^{o}F and be rated for million cycle design. Valves will be supplied by Hayward or Engineered approved equivalent.

2.3 FLANGES

A. Flanges shall be Schedule 40 PVC and conform to ANSI 150 psi pressure rating.

2.4 PIPING SUPPORT SYSTEMS

A. Piping shall be supported in general and as shown on Contract Drawings.

B. No attempt has been made to show all required pipe supports in all locations where shown on the Contract Drawings. The absence of pipe supports and details on any Drawing shall not relieve the Contractor of the responsibility for providing them where needed or in accordance with applicable Standards and Codes or manufacturers recommendations.

C. Where piping connects to equipment, piping connections shall be supported by pipe support, not equipment, instruments or controls.

D. Pipe support system components shall withstand the dead loads imposed by the weight of the pipe system (filled with water where applicable). Commercial pipe supports and hangers shall have a minimum safety factor of 5.

E. Horizontal piping runs along walls of the vault shall be supported by a fiberglass framing system attached to acceptable anchors, Unistrut, Aickinstrut, or Engineer approved equal. No pipe shall be supported from a pipe above it or in-line instruments, control devices or valves.

F. Horizontal piping runs along floors in the treatment building shall be supported by fiberglass framing system attached to acceptable anchors, Unistrut, Aickinstrut, or

Engineer approved equal. No pipe shall be supported from a pipe above it or in-line instruments, control devices or values.

G. Vertical piping hangers and supports shall be channel and pipe straps manufactured by Unistrut, Aickinstrut, or Engineer approved equal.

H. Unless noted otherwise on the Contract Drawings, maximum horizontal pipe support spacing shall be as follows:

Pipe Size (nominal outside diameter)	Unsupported Pipe Span
1" to 4"	5'
4" to 8"	5'

I. All piping shall be supported in a manner which will prevent undue strain on any valve, fitting, instrument or control device, or equipment. In addition, supports shall be provided at changes in direction or elevation, adjacent to flexible couplings, and where otherwise shown on Contract Drawings.

PART 3 - EXECUTION

3.1 QUALITY CONTROL

A. Piping shall be designed and installed to allow for testing of new pipe sections connected to existing piping or piping installed by others. Use flanges, blinds, etc, as needed.

B. Contractor shall perform pressure testing of all pipe sections and fittings while piping is exposed, prior to cover and backfill. The test method is to be approved by the Engineer and piping manufacturer. Prior to final acceptance of the piping system by the Engineer, the Contractor shall perform hydrostatic testing of the piping system. Contractor shall provide Engineer twenty-four (24) hours notice to witness piping test prior to completion of test and backfill.

C. Test pipe in accordance with piping manufacturer's recommendations. Contractor shall provide all material, equipment, and labor for testing of piping systems. At a minimum, pipe will be hydrostatically tested as follows:

1. Fill pipe with water for two to three hours at 150% of rated working pressure.

2. Relieve pressure after two to three hour period and then bring pressure back up to 150% of rated working pressure.

3. Allow hydrostatic test to continue for three to four hours.

4. Confirm pressure loss is within manufacturer's suggested pipe loss factor.

D. Test Records: Records shall be made of each piping system installation during the test. Records shall include:

1. Date of test

2. Description and identification and/or location of piping tested.

3. Test fluid

4. Test pressure

5. Remarks and notes to identify leaks (type and location)

6. Repairs made on leaks

7. Results of retest

8. Certification by Contractor and signed acknowledgement by Engineer.

3.2 WORKMANSHIP

A. Each pipe and fitting shall be carefully inspected before the pipe or fitting is installed in the piping system. Clean ends of pipe thoroughly per manufacturer's instructions and applicable specifications and standards. Remove foreign matter and dirt from inside of pipe and handle to avoid any physical damage to pipe.

3.3 FABRICATION

A. Verify all dimensions for installation work. Bending or offsetting of finished piping connections shall not be acceptable.

B. All pipe flanges shall be set level, plumb and aligned. All fittings shall be true and perpendicular to the axis of the pipe. All bolt holes in flanges shall straddle vertical centerline of pipes.

C. Unions shall be installed where required for piping or equipment installation and subsequent removal, even if they are not shown on the Contract Drawings.

D. Flanges shall be bolted using a suitable filler gasket compatible with the influent water. The gasket shall bear the bolt load uniformly and remove the flange moment from that part of the flange protruding beyond the outer edge of the face.

E. Piping shall be installed without springing or forcing the pipe in a manner which would set up stresses in the pipe, valves or connected equipment.

F. Required straight runs of piping upstream and downstream of flow measuring devices shall be smooth.

G. Where valve handwheels are shown, valve orientation shall be as shown. Where valve handwheels are not shown, valves shall be oriented to permit easy access to the handwheels.

H. Vent high points and drain low points of all pipelines.

I. All sample valves shall be placed and oriented for ease of sample collection in one-liter containers.

3.4 PIPE INSTALLATION

A. Clean all pipe inside and out after fabrication and prior to installation. Care shall be exercised during installation to prevent the accumulation of pipe cuttings and filings, gravel, cleaning rags, etc. within piping sections. All piping shall be examined to assure removal of these and other foreign objects prior to assembly. Shop cleaning may employ any commercial means if it does not involve the use of organic solvents, or solvents that corrode, deform, swell, or otherwise alter the physical properties of the material being cleaned. Contractor shall not employ the use of any organic solvents for pipe cleaning without informing Engineer, and providing an MSDS for the solvent, and obtaining written permission from Engineer to use the solvent.

B. Adequately support above-ground piping to prevent sagging, pocketing, swaying, or displacement. Properly space and apply hangers to achieve the desired result, and do not space piping supports farther than specified in the Contract Documents or manufacturer's specifications.

C. For all above-ground piping, provide hangers at unions and each offset or change in direction.

D. Install piping to the lines and grades shown on the Contract Drawings.

E. Run piping free from contact with structures or installed items.

F. Allow clearances for expansion and contraction of pipe.

G. Place buried pipelines to the lines and grades indicated on the Contract Drawings and in accordance with Section 02 22 00.

H. Piping connections shall be made in strict accordance with manufacturer's recommendations.

I. Contractor shall be solely responsible for untreated groundwater releases during the implementation of the Work. Contractor shall notify Engineer in writing prior to introducing untreated groundwater to any portion of the piping system during the work.

3.5 FINAL CLEANING

Following assembly and testing and prior to final acceptance, all pipelines installed under this section shall be flushed with water and all accumulated construction debris and other foreign matter shall be removed. Flushing velocities shall be a minimum of 3 feet per second. Cone strainers shall be inserted in front of rotating mechanical equipment, instruments and major equipment and left there until cleaning has been accomplished.

END OF SECTION 40 05 00

SECTION 40 91 00

PRIMARY PROCESS MEASUREMENT DEVICES

PART 1 - GENERAL

1.1 SCOPE

This section describes the requirements for furnishing and installing process measurements devices including flow meters and gauges.

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTALS

A. Contractor shall make submittals in accordance with the requirements of Section 01 33 00.

B. Product Data: The Contractor shall provide for the flow meters and gauges.

1.4 APPLICABLE STANDARDS

A. Uniform Mechanical Code (UMC).

B. Uniform Plumbing Code (UPC).

C. Comply with all referenced and applicable commercial standards, specifications, codes, and rules, including current addenda and errata.

D. Where Contract Drawings or Technical Specifications do not conform with minimum applicable codes or with utility agencies rules and regulations, the codes, rules, or regulations shall govern as directed by the Engineer.

PART 2 - PRODUCTS

A. Air Sparge Manifold Air Flow Meters

1. Air flow meters on the air sparge manifold shall be Dwyer Model UV-C112 (inline) or Engineer approved equivalent.

2. Flow meter shall be constructed of Polysulfone body, Fluoroelastomer O-rings and virgin PTFE float.

3. Temperature limits shall be 35 to 212°F.

4. Accuracy ±2% full scale @ 70°F ±2°F (21.1°C) and 14.7 psia.

5. Process connections shall be 1" female NPT.

B. Soil Vapor Extraction Air Flow Meters

1. SVE air flow meters shall be Dwyer DS-300 self averaging pitot tubes or Engineer approved equivalent.

2. Pitot tubes shall be stainless steel with brass compression fittings.

3. Pitot tubes should be rated for 200 psi and 200°F.

4. Pitot tube model shall be selected based on the pipe diameter shown on the contract drawings.

C. Vacuum Gauges

All vacuum gauges shall be Wika 0-80 inches H_2O range, glycerine filled, with ¼" MPT connection or Engineer approved equivalent.

C. Pressure Gauges

All pressure gauges shall be Wika 0-30 psi range, glycerine filled, with ¼" MPT bottom connection or Engineer approved equivalent.

D. Temperature Sensor

All temperature gauges shall be Ashcroft bi-metal dial thermometer or Engineer approved equivalent. The thermometer length will be determined by the pipe size shown on the Contract Drawings. The thermometer shall be installed in a corresponding Ashcroft thermowell to protect the temperature sensor.

PART 3 - EXECUTION

3.1 GENERAL

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means Contractor accepts existing conditions.

3.2 INSTALLATION

A. All products are to be installed as specified by the manufacturer, all other applicable specification sections and contract drawings, and in accordance with all applicable documents, codes, and standards specified in 1.4 above.

B. Install items plumb and level, accurately fitted, free from distortion or defects.

3.3 FIELD QUALITY CONTROL

Field inspection will be performed by the Engineer under provisions of Section 01 43 00 and in accordance with manufacturer(s) requirements.

END OF SECTION 40 91 00

SECTION 40 92 00

PRIMARY CONTROL DEVICES

PART 1 - GENERAL

1.2 SCOPE

This section describes the requirements for furnishing and installing process control devices including solenoid valves, timers, pressure relief valves, vacuum relief valves, level controls, pressure switches, and thermal overload switches.

1.2 DESCRIPTION

(Not Used)

1.3 SUBMITTALS

A. Contractor shall make submittals in accordance with the requirements of Section 01 33 00.

B. Product Data: The Contractor shall provide for all primary control devices.

1.4 APPLICABLE STANDARDS

A. All work shall conform to requirements of Illinois State Electrical Code and any local codes and regulations that may apply.

B. All materials shall be new and shall meet requirements of Underwriters Laboratories wherever standards have been set for items in question and shall meet minimum standards of IEEE, ASA, ANSI, NEMA and ASTM.

C. All work shall be installed in accordance with NECA standards of installation.

D. Uniform Mechanical Code (UMC).

E. Uniform Plumbing Code (UPC).

F. Comply with all referenced and applicable commercial standards, specifications, codes, and rules, including current addenda and errata.

G. Where Contract Drawings or Technical Specifications do not conform with minimum applicable codes or with utility agencies rules and regulations, the codes, rules, or regulations shall govern as directed by the Engineer.

PART 2 - PRODUCTS

A. Solenoid Valves

1. Solenoid valves for the air sparge and soil vapor extraction manifolds shall be supplied and installed in accordance with the Contract Documents and Drawings.

2. Engineer approval of contractor selected solenoid valves is required.

B. Timers

1. Timers for the operation of the air sparge and soil vapor extraction solenoid valves shall be supplied and installed in accordance with the Contract Documents and Drawings.

2. Engineer approval of contractor selected timers is required.

C. Pressure Relief Valves

1. Pressure relief valves on the discharge of the air compressor of the air sparge system shall be supplied and installed in accordance with the Contract Documents and Drawings.

2. Engineer approval of contractor selected pressure relief valve is required.

D. Vacuum Relief Valves

1. Vacuum relief valves on the vacuum side of the soil vapor extraction blower shall be supplied and installed in accordance with the Contract Documents and Drawings.

2. Engineer approval of contractor selected vacuum relief valve is required.

E. Level Controls

1. Stainless steel conductivity sensors for the level control of the air/water separator tank shall be supplied and installed in accordance with the Contract Documents and Drawings.

2. Engineer approval of contractor selected conductivity sensors is required.

F. Pressure Switches

1. Pressure switches on the air sparge manifold to monitor the discharge pressure from the sparge blower shall be supplied and installed in accordance with the Contract Documents and Drawings.

2. The pressure switch shall be capable of signaling a low pressure and high pressure condition.

3. Engineer approval of contractor selected pressure relief valve is required.

G. Overload Switches

1. Thermal overload switches for the air sparge blower motor and the soil vapor extraction blower motor shall be supplied and installed in accordance with the Contract Documents and Drawings.

2. Engineer approval of contractor selected vacuum relief valve is required.

PART 3 - EXECUTION

3.1 GENERAL

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means Contractor accepts existing conditions.

3.2 INSTALLATION

A. All products are to be installed as specified by the manufacturer, all other applicable specification sections and contract drawings, and in accordance with all applicable documents, codes, and standards specified in 1.4 above.

B. Install items plumb and level, accurately fitted, free from distortion or defects.

3.3 FIELD QUALITY CONTROL

Field inspection will be performed by the Engineer under provisions of Section 01 43 00 and in accordance with manufacturer(s) requirements.

END OF SECTION 40 92 00

SECTION 40 95 00

PROCESS CONTROL HARDWARE

PART 1. GENERAL

1.1 SCOPE

A. Work to be performed under this specification includes all labor, materials and equipment required for the remediation system telemetry as described in these specifications and as shown on the Drawings.

B. All labor, materials and equipment shall also be subject to all applicable sections of Division 00 and Division 01 forming a preface and are a part of these specifications.

1.2 DESCRIPTION

(NOT USED)

1.3 SUBMITTALS

A. The Contractor shall make all submittals under provisions of Section 01 33 00.

B. Shop Drawings

1. Submit three copies of shop drawings to Engineer for review before fabrication and installation. Shop drawings shall include, but not necessarily limited to schematics, wiring diagrams, dimensions, performance data and any other information required by these specifications or as considered necessary by Engineer.

2. Review by Engineer is only for conformance with the design concept of the project and compliance with the specifications and Drawings. Engineer's review does not in any way relieve Contractor, manufacturer or supplier from the responsibility for furnishing materials and performing the work in conformance with the Drawings and specifications and in a safe manner.

3. Prior to submission, carefully check all data for compliance with specifications. He shall also indicate only that material which is applicable by circling catalog numbers, Drawings, etc., to clearly indicate his intent.

4. Shop drawings shall indicate job name, date, and Contractor. Shop drawings shall be submitted in a group for a particular system or category (i.e., lighting fixtures, service equipment, etc.) in brochure form with index or list of equipment. No consideration will be given data not submitted in accordance with the above.

5. The manufacturers indicated in the bid documents shall be used in the base bid. If an "approved equal" is desired to be used, it shall be bid as an alternate to the base bid. Attach to the proposal form, sheet(s) with a brief description of the materials (including source of manufacturer, model

number, basic ratings, etc.) along with an "addition to" or "deduct from" the base bid noted on the attached sheet(s).

1.4 APPLICABLE CODES, STANDARDS, AND WORKMANSHIP

A. All work shall conform to requirements of Illinois State Electrical Code and any local codes and regulations that may apply.

B. All materials shall be new and shall meet requirements of Underwriters Laboratories wherever standards have been set for items in question and shall meet minimum standards of IEEE, ASA, ANSI, NEMA and ASTM.

C. All work shall be installed in accordance with NECA standards of installation.

D. All Permits and inspection fees shall be paid for by Contractor.

E. All work shall conform where applicable to the Williams-Steiger Occupational Safety and Health Act of 1970 (OSHA), Part 1910, "Occupational Safety and Health Standards".

F. Install all equipment and fixtures forming part of the work of this section in complete accordance with the manufacturers' recommendations.

PART 2. PRODUCTS

2.1 CONTROL PANEL

A. The control panel shall allow for the operation of all primary control devices listed in this section.

B. The control panel shall contain the telemetry system specified in Section 27 20 00 of this document.

C. The control panel shall contain individual alarm lights or indicators for each alarm condition specified in the Contract Documents. It is not acceptable to have the same alarm light or indicator for multiple alarm conditions.

D. Each major piece of equipment shall have a hand-off-auto switch that allows the equipment to run in automatic mode or to manually override the control logic for startup and troubleshooting.

E. The control panel shall include a transient surge suppression system to protect the controller from voltage variations and surges.

F. The control panel shall contain an operator interface for the programmable logic controller. The interface will allow field manipulation of control logic program.

2.2 PRESSURE SENSORS

A. Air sparge compressor discharge pressure sensor (1 total) shall be capable of sending send a 4-20mA to the control panel/PLC for remote monitoring.

B. Air sparge compressor discharge pressure sensor shall be rated for the maximum pressure of the air compressor.

C. Air sparge individual well pressure sensors (15 total) shall be capable of sending send a 4-20mA to the control panel/PLC for remote monitoring.

D. Air sparge individual well pressure sensors (15 total) shall be rated for the maximum pressure of the air compressor.

2.3 VACUUM SENSORS

A. SVE Blower influent vacuum sensor (1 total) shall be capable of sending send a 4-20mA to the control panel/PLC for remote monitoring.

B. SVE Blower influent vacuum sensor shall be rated for the maximum vacuum of the blower.

C. SVE individual well vacuum sensors (6 total) shall be capable of sending send a 4-20mA to the control panel/PLC for remote monitoring.

D. SVE individual well pressure sensors (6 total) shall be rated for the maximum vacuum of the blower.

2.4 DIFFERENTIAL PRESSURE/FLOW SENSORS

A. Air sparge compressor discharge differential pressure sensor (1 total) shall be capable of sending send a 4-20mA to the control panel/PLC for flow calculations and remote monitoring.

B. SVE Blower influent differential vacuum sensor (1 total) shall be capable of sending send a 4-20mA to the control panel/PLC for flow calculations and remote monitoring.

2.5 ACTUATED VALVES

A. Air sparge compressor discharge actuator valve (1 total) shall be capable of sending send a 4-20mA to the control panel/PLC for remote monitoring and remote operation.

B. SVE Blower influent actuator valve (3 total) shall be capable of sending a 4-20mA to the control panel/PLC for remote monitoring and remote operation.

2.6 SOLENOID VALVES

A. Air sparge manifold solenoid valves (3 total) shall timer operated. Timers shall be manually and remotely adjustable.

B. Vacuum manifold solenoid valves (3 total) shall be timer operations. Timers shall be manuualy and remotely adjustable.

PART 3. EXECUTION

3.1 GENERAL

A. Panel Installation

1. Install panels in accordance with NFPA 70 - National Electric Code.

2. Install panelboards and control panels plumb.

3. Height: 6 feet to top of panelboard; install panelboards taller than 6 feet with bottom no more than 4 inches (10 cm) above floor.

4. Installed panels shall have adequate exterior working space to permit safe access to components.

5. Provide filler plates for unused spaces in panelboards.

6. Provide typed or neatly handwritten circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.

7. Make control electrical wiring interconnections, as shown on the Drawings. Follow wire identification specifications, as outlined below in section 3.6.

B. All control sensors shall be installed according the manufactures specifications.

END OF SECTION 40 95 00

SECTION 44 11 00

AIR POLLUTION CONTROL EQUIPMENT

PART 1 - GENERAL

1.1 SCOPE

A. This Specification provides information for the supply and installation of the Vapor Phase Carbon Tanks.

B. Should there be any conflict between any specification and/or data sheets, the order of precedence shall be:

1. Equipment Data Sheet

2. This Specification

3. Reference Specifications

1.2 DESCRIPTION

Two Carbonair GPC 20R vapor phase carbon filters with 2,000 pounds of virgin activated carbon or equal.

1.3 SUBMITTALS

A. The contractor shall make all submittals under provisions of Section 01300.

B. Product data including pressure drop of selected model at discharge flow rate of the blower, weights (shipping, installed, and operating), furnished specialties, and accessories. Indicate dimensions, required clearances, methods of assembly of components and piping connections.

C. The following documentation:

1. Dimensional drawing

2. Instructions and manuals

3. Parts List

4. Cross-sectional Drawings

5. Bill of Materials

6. Weights, Forces, and Calculations.

7. Material Certifications

8. ASME Code Data (where required)

1.4 APPLICABLE STANDARDS

Codes, specifications, and standards referred to by number or title shall form a part of this specification to the extent required by the reference thereto:

A. American National Standard Institute

ANSI B16.5 Pipe Flanges and Flanged Fittings

ANSI B1.1 Unified Screw Threads

B. American Society for Testing and Materials

ASTM Book of Standards, Volume 01.01: Steel Piping, Tubing and Fittings.

ASTM Book of Standards, Volume 08.01, 08.02, 08.03, 08.04: Plastics (1,2,3) and Plastic Pipe and Building Products

C. Federal Occupational Safety and Health Regulations

PART 2 - PRODUCTS

2.1 GENERAL

A. Materials and products shall be first quality, new, and be furnished in strict accordance with this specification.

B. All components and options shall meet requirements specified on the Equipment Data Sheet.

2.2 EQUIPMENT DESIGN REQUIREMENTS

A. Two steel carbon vessels shall meet or exceed all DOT transportation requirements for shipping the vessels to be regenerated.

B. Vessels shall be mounted on steel skid frames that have fork truck channels for loading and unloading.

C. Vessels shall be connected utilizing quick connect fittings for the ease of carbon change outs.

D. Activated Carbon shall be granular virgin form.

E. Each vessel will contain a minimum of 2,000 lbs. carbon.

F. Carbon shall have a minimum of # 1000 Iodine rating.

G. Vessels shall have a minimum diameter of 4.3', have a minimum bed depth of 4' and have a maximum loading of 40 ft/min.

PART 3 - EXECUTION

3.1 INSTALLATION

All equipment shall be furnished in accordance with this specification, the Equipment Data Sheet, and the Contract Documents. The carbon vessels shall be installed in accordance with the manufacturer's recommendations.

END OF SECTION 44 11 00